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The RCAF Must Adopt a Niche Capability Model to Remain Combat Effective

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LIST OF ABBREVIATIONS

AAR	Air-to-air Refueling
ABM	Air Battle Manager
ACSO	Aircraft Combat Systems Officer
ADIZ	Air Defence Identification Zone
AEC	Aerospace Control Officer
AEW	Air Expeditionary Wing
AFB	Air Force Base
AI	Artificial Intelligence
AMC	Air Mobility Command
AMD	Air Mobility Division
AO	Area of Operation
AOO	Air Operations Officer
ASOC	Air Support Operations Centre
ATC	Air Traffic Control
ATF	Air Task Force
ATO	Air Tasking Orders
AWACS	Airborne Warning and Control Systems
BVR	Beyond Visual Range
C2	Command and Control
C3	Command, Control and Communication
CA	Canadian Army
CADS	Canadian Air Defence Sector
CAF	Canadian Armed Forces
CANSOFCOM	Canadian Special Operations Forces Command
CAOC	Combined Air and Space Operations Centre
CAP	Combat Air Patrol
CAS	Close Air Support
CFC	Canadian Forces College
CDS	Chief of Defence Staff
CENTCOM	Central Command
CFB	Canadian Forces Base

COIN	Counterinsurgency
COP	Common Operating Picture
CRC	Control and Reporting Centre
DCA	Defensive Counter Air
DND	Department of National Defence
EDA	European Defence Agency
EU	European Union
EW	Electronic Warfare
FAOC	Future Air Operating Concept
FWSAR	Fixed Wing Search and Rescue
FC	Functional Concept
FE	Force Employment
FFCP	Future Fighter Capability Project
FG	Force Generation
FLIR	Forward looking Infrared Camera
FOC	Final Operational Capability
FY	Fiscal Year
HCMCS	Her Majesty's Canadian Ship
HVAA	High Valuable Airborne Asset
IA	Interdiction Activity
IAF	Israeli Air Force
IED	Improvised Explosive Device
IOC	Initial operational Capability
JCSP	Joint Command and Staff Program
JFACC	Joint Forces Air Component Commander
JFS	Joint Strike Fighter
JTAC	Joint Terminal Attack Controller
JTFSC	Joint Task Force Support Component
LGB	Laser Guided Bomb
MCCE	Movement Coordination Centre Europe
MEL	Military Employment Limitation
MSE	Mission Support Element
NASP	National Air Surveillance Program

NATO	North Atlantic Treaty Organization
NFTC	NATO Flying Training Centre
OEF	Operation Enduring Freedom
OIR	Operation Inherent Resolve
OSH-K	Operational Support Hub – Kuwait
QRA	Quick Reaction Aircraft
RAAF	Royal Australian Air Force
RCN	Royal Canadian Navy
RFE	Request for Effect
RFI	Request for Information
RPAS	Remote Piloted Aircraft System
SAC	Strategic Airlift Capability
SACC	Strategic Airlift Coordination Centre
SALIS	Strategic Airlift International Solution
SAR	Search and Rescue
SOF	Special Operations Force
SSE	Strong, Secured and Engaged
STTC	Strategic Tanker Transport Capability
Tal Det	Tactical Detachment
TC	Transport Canada
TIC	Troops in Contact
US	United States
USAF	United Stated Air Force
WoG	Whole of Government

TO REMAIN COMBAT-EFFECTIVE, THE RCAF MUST ADOPT A NICHE CAPABILITY MODEL

ABSTRACT

The Canadian Defence Policy *Strong Secured and Engaged* (SSE) calls for the Canadian Armed Forces (CAF) to train and be ready to deploy within the full spectrum of operations. The current demand for air power, however, exceeds the Royal Canadian Air Force's (RCAF) capacity. The RCAF is staffed below the optimal range and Reconstitution is the current main effort. Considering its size, the RCAF will continue to be engaged in the world by the means of contribution warfare. Air power writers have disused the future of smaller air forces and how they can be effective. The RCAF must carefully look at those options to remain relevant in future conflicts. Doing more with less is not an option anymore.

To ensure that the RCAF remains viable, a niche capability model must be adopted. This paper proposes three niches for the RCAF that would appeal to policymakers in Canada and serve a useful purpose for Canada's allies. The first identified niche capability is air transport. The second niche is the air-to-air refueling capability. Finally, the last niche for the RCAF is in command and control of air assets. To achieve this niche capability model air force, other RCAF areas or activities must be reviewed. The SAR mandate, fighter operations and 441 Squadron are a few identified activities that are recommended for review in this paper.

INTRODUCTION

The demand for air power has never been greater. An increasing rate of domestic operations due to climate change and an ever more unstable global world order has put increasing demands on air forces. With the number of potential conflicts continuously rising in Africa, the recent war in Ukraine and the threat of China in the Indo-Pacific region, the Royal Canadian Air Force (RCAF) will continue to be employed in a world where the demand for military operations exceeds the supply. The RCAF continues to train for the full spectrum of operations. Most of the current fleets are aging and require more maintenance per flying hour than before. The Canadian Armed Forces (CAF) is also facing a staffing challenge. This is a perfect storm: aging assets coupled with a lack of experienced personnel.

The solution seems simple: recruit more aviators and renew the fleets. However, as Clausewitz mentioned, "everything in war is very simple, but the simplest thing is difficult."[1] When expressing the idea of fleet renewal, procurement and budget are limiting factors and must be considered. A structural component contributing to the CAF's challenge is that the Canadian society is also facing a massive shortage of workers. The Chief of Defence Staff (CDS) recently declared that the CAF are in a state of crisis regarding recruiting.[2] Military operations are increasing, and the CAF are facing a 14% deficit within the ranks (17% within the RCAF).[3] If the CAF are unable to fill the empty positions, new ways of conducting business must be introduced. Canadians are expecting their armed forces to be there in times of need and the CAF must also be ready to respond to international crisis. The concept of doing more with less has reached its limit and it is now the time to think differently. In his masterpiece *On War*, Clausewitz discusses at length the intellect required to conduct war. Clausewitz also considers the courage required for the soldiers both on the battlefield but also in the way to innovate and rethink the battlefield:

> If the mind is to emerge unscathed from this relentless struggle with the unforeseen, two qualities are indispensable: first, an intellect that, even in the darkest hour, retains some glimmerings of the inner light which leads to truth; and second, the courage to follow this faint light wherever it may lead.[4]

This is what this directed research paper intends to be: bold, innovative and truth seeking even if it is uncomfortable to some readers.

Challenging the status quo is how one gets ahead of one's enemies. As the Western World is slowly losing the technological advantage to potential foreign adversaries, cooperation within coalitions is key to victory. The RCAF cannot pretend to be a large air force nor to significantly contribute to offensive air operations other than with specific niche capabilities.

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[1] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 119.
[2] Rachel Gilmore, "Global order is 'faltering,' Canada's defence chief warns amid recruitment worries." *Global News*, October 6, 2022, last accessed 10 April 2023, https://globalnews.ca/news/9181117/russia-canada-military-caf-wayne-eyre-cds/
[3] Government of Canada, Military Command Software, Personnel Dashboard available on the DWAN only.
[4] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 102.

Accordingly, this paper will argue that the RCAF must adopt a niche capability model to remain combat effective. The discussion in this directed research paper will revolve around what defines a niche capability**,** where should the RCAF focus their effort, and what lines of effort should be abandoned.

Adopting a niche capability model to remain combat effective would be daring. Australian academic Sanu Kainikara states that small air forces "must continue to maintain realistic capabilities while ensuring that adequate flexibility is maintained to tailor these to meet lesser requirements."[5] Defining what is realistic for the RCAF and what is not can also turn into an emotional adventure as some senior leaders are sentimentally attached to capacities, assets and command and control (C2) structure based on their experience and personal career. This research paper will be based on facts rather than emotion, logic rather than politics, and consider the global world order through the lens of realism rather than constructivism. [6]

The first chapter focus on the current Reconstitution effort of the CAF and present some challenges, assumptions and try to frame the problem. The second chapter will introduce the first proposed niche by exploring the requirement for air transport. It will examine NATO's requirements and solutions and explore how the RCAF can and should integrate within NATO's air mobility operations. The third chapter examines air-to-air refueling (AAR) as a potential niche. This chapter will study the requirement for tankers during domestic operations ad for deployed operations, and then analyze the NATO's way of approaching the refueling capability. The fourth chapter will analyze the C2 required for air operations with a special interest to the NATO Airborne Warning and Control System (AWACS). The fifth chapter will examine some activities that the RCAF could abandon. Finally, the sixth chapter will analyze the advantages and the disadvantages of adopting those niche capabilities and present viable options to increase the efficiency of the RCAF.

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[5] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 14.

[6] Dario Battistella, *Théories des relations internationales* (Paris: Presses de la fondation nationale des sciences politiques, 2012), 127/329.

Battistella defines realism using four propositions. The first one refers to State-centrism where the States are the most important actors. The second proposition is that the international system is anarchic and there is no actor above the states capable of preventing or terminating conflict amongst nations. The system is also in a perpetual state of anarchy. The third proposition is that all nations are rational actors willing to maximize their power. States are pursuing growth in their self-interest. Balance of power is the only way to achieve stability and states build their military to survive.

Battistella defines constructivism as putting forward the impact of ideas that are held collectively. Instead of considering the state as a data and assuming that the states are only looking at their survival, constructivism considers the interest and identity as flexible product of historical process. Constructivists allow for a greater importance of ideational factors because they are the base on which rules are established and accepted.

CHAPTER 1 – RECONSTITUTION AND RCAF NICHES

This chapter introduces the conceptual basis for a niche model for the RCAF. It establishes the basic concepts so that the reader can easily understand this directed research project and better follow the arguments presented by the author. Chapter 1 explores how the current main Reconstitution effort can be leveraged to promote positive changes within the RCAF. This chapter further defines the problem and identifies what needs to be amended within the RCAF. Finally, it addresses the pilot's bias as a potential institutional issue.

CAF Reconstitution and the RCAF

Recently released by the Chief of Defence Staff (CDS), the Directive for the CAF's Reconstitution identifies deficiencies that are hampering the composition and readiness of the Canadian Armed Forces and set priorities to overcome those obstacles.[7] Concentration of force and economy of effort are not new concepts. The principle that available forces are utilized in the most effective way where subsidiary tasks are either discarded or somehow delegated can be linked to one of Clausewitz's principles of war.[8] Clausewitz defines those tasks as *idling,* and this is what the CDS is trying to convey to subordinate organizations: stop idling and rejoin the fight.

Pushing this reflection further and applying the same philosophy to the RCAF, one can find that economy of effort could be obtained by adapting a niche capability model. Before defining the concept of niche capability and what should be the desired effect, it is important to understand and accept that the RCAF is a small air force based on its budget, the fleets, and the number of qualified aviators.[9] The RCAF is not able to sustain large-scale operations on its own for a prolonged period. The RCAF has been able to conduct various missions without a coalition,

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[7] Specifically, the directive reads:
Personnel and staffing issues, combined with a changing demographic and expectations of our existing and potential work force, continue to challenge both the strength and the readiness of the CAF.
The interim goal of the CAF reconstitution is to address shortcomings that are preventing the CAF more specifically from being in the position it needs to in order to excel as a modern and combat-ready military force. This directive, which will be the first of several as we progress through the themes of this considerable endeavour, will lay out the complementary lines of effort that will adjust the operational commitments within the bounds of the direction provided by the Government of Canada (GC) and modernize our personnel generation process.
Government of Canada, " CDS/DM Directive For CAF Reconstitution," last accessed 6 May 2023, https://www.canada.ca/en/department-national-defence/corporate/policies-standards/dm-cds-directives/cds-dm-directive-caf-reconstitution.html

[8] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 213.
In his third book, On Strategy, Clausewitz classifies various types of strategic elements: moral, physical, mathematical, geographical, and statistical. Each element is further divided. Those concepts can be seen as the predecessors (or at a minimum some influence) of the current principle of war in the CAF doctrine.

[9] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 14.
The classification of air forces and the rationalization of why the RCAF is a small air force is explained at a later point in this chapter.

but they were limited in scope, complexity, duration, and risk.[10] As Australian air power academic Sanu Kainikara has observed, "small air forces have the tough task of having to ensure balanced capabilities while dealing with the realities of the present and preparing to face the extreme uncertainty of the future."[11] This is certainly the case for the RCAF. To prepare for this uncertain future and to meet today's demand for air power, it is necessary to allocate resources where they are most needed and adopt an approach at all management level that encourage and facilitate the economy of force.

The United States Army defines economy of force as "expend[ing] minimum essential combat power on secondary efforts to allocate the maximum possible combat power on the main effort."[12] The Reconstitution directive from the CDS is in line with this concept, as it ------- explain the connection very briefly. The RCAF should thus pursue relevance through capacity. In *Preparing the RCAF for the Future*, Canadian air power academic Richard Goette mentions that "for smaller air forces [that] have been able to maintain a balance of capabilities, [it] has come at the expense of the depth of these capabilities in terms of numbers (platforms and personnel) and the related challenge of how long they can sustain operations."[13] A clear understanding of this statement is paramount to accept or reject a niche capability model. Moving away from a full spectrum of operations air force to a niche aviation is a bold move and requires an in-depth analysis. For every advantage, there is a disadvantage, as the following naval example demonstrates.

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[10] Examples include Op PRESENCE Uganda, Op RENAISSANCE (multiple), Op GLOBE, Op LENTUS (multiple) etc. Government of Canada, *Military Operations*, last accessed 20 February 2023, https://www.canada.ca/en/department-national-defence/services/operations/military-operations.html
Op PRESENCE is defined as the Canadian Armed Forces' (CAF) contribution to the Government of Canada's peace operations strategy. This includes the commitment of high-value military capabilities to various United Nations peacekeeping missions. The Tactical Airlift Detachment consists of one CC-130J Hercules aircraft, operated, and supported by approximately 25 CAF members. It deploys for multiple episodes several times per year to assist with transporting troops, equipment and supplies to the UN Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) and the UN Mission in South Sudan (UNMISS).
Op RENAISSANCE is the activation of Contingency Plan (CONPLAN) RENAISSANCE, the Canadian Armed Forces' (CAF) plan for rapid deployment to the scene of a disaster overseas, as directed by the Government of Canada. It provides direction to the CAF in the event of a decision by the Government of Canada to respond to a request from another nation for help. In 2018, an Air Task Force (ATF) was stood up in Indonesia following a 7.5 magnitude earthquake. In 2019, the Government of Jamaica requested Canada's assistance to transport their Jamaica Defence Force (JDF) Disaster Assistance Response Team (DART) to the Bahamas. An Air Detachment was stood up and deployed to the Bahamas with a RCAF CC130J. The last renaissance type of operation was in 2020. The CAF aided bushfire relief efforts by providing a CC-177 Globemaster to deliver fire retardant followed by in-theatre airlift support. Additionally, the CAF supported fire prediction modelling by providing data gathered from the RADARSAT Constellation Mission (RCM). All support was given in coordination with the Australian Defence Force (ADF). Operation GLOBE is part of the CAF's commitment to active engagement abroad. These deployments give CAF members the opportunity to work alongside personnel from other government departments, as well as other nations.

[11] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 15.

[12] United States Army, FM 3-0, Operations (Washington, D.C.: Government Publishing Office, October 2022), 1-8 last accessed 03 February 2023 https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN36290-FM_3-0-000-WEB-2.pdf.

[13] Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations* (Trenton, On: Royal Canadian Air Force Aerospace Warfare Centre Production Section, 2020), 81 https://publications.gc.ca/collections/collection_2021/mdn-dnd/D2-420-2020-eng.pdf

While addressing students and staff at the CFC, the Royal Canadian Navy (RCN) Commander, discussed the state of the navy.[14] In particular, he mentioned that the RCN is in a similar posture about equipment and personnel as the other elements. The RCN commander also mentioned that the leasing of the replenishment ship *Asterix* was a solution to gap the lack of tankers or support ship between the end of life of Her Majesty's Canadian Ships (HMCS) *Preserver* and *Protecteur* and the delivery of the Joint Support Ship (JSS). A critical aspect of the RCN Commander's remarks was that the lease of *Asterix* was extremely useful to conduct replenishment at sea (refueling other ships), but the main reason for the leasing of the ship was to maintain the skills of the sailors. Indeed, without a tanker, the skills of the sailors would fade away and it is extremely difficult to rebuild a capacity when it is gone.[15] The same principle applies for the RCAF. However, before moving away from a certain type of activity, the outcome must be well understood. Economists would define it as the cost of opportunity.[16]

Adopting a niche capability model is not without consequences. However, this directed research paper intends to present both sides and weight the outcome of each proposal. To properly assess those risks, it is important to define the framework of the analysis, explain the key concepts, and finally, use an appropriate language recognized amongst air power theorists. Although the future is known to no one, it is appropriate and useful to assume certain facts based on history and the preponderance of probabilities. For this reason, assumptions must be made before continuing to dive further into what niche capabilities the RCAF should pursue.

Assumptions

Assumption 1. The RCAF will always be part of a coalition for large-scale operations.

The RCAF will not conduct large-scale operations outside Canada on its own. The term "large" itself can be unclear as it has to do with the available forces in comparison to the entire available assets and personnel. As an example, deploying eight Chinook helicopters on a domestic operation would be possible for a short period of time but would have a severe impact on Force Generation (FG) since those assets are always in great demand.[17] Adding contingency operations to the already busy schedule of the squadron would have a domino effect on the fleet availability for other operations or exercises. For the U.S. Army or U.S. Air Force, deploying

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[14] Vice-Admiral Angus Topshee, "Royal Canadian Navy" (lecture, Canadian Forces College, Toronto, ON, January 19, 2002), with permission.

[15] Ibid.

[16] Gregory N. Mankiw, *Principles of Microeconomics*, 8th ed. (Mason, OH: CENGAGE Learning Custom Publishing, 2016. Opportunity cost refers to what you have to give up to buy what you want in terms of other goods or services.

[17] Canada. Government of Canada. "450 Tactical Helicopter Squadron." Last accessed 8 May 2023, https://www.canada.ca/en/air-force/corporate/squadrons/450-squadron.html
450 Tactical Helicopter Squadron is based at CFB Petawawa and operates the CH-147F Chinook helicopter. The squadron is the only one in Canada to fly the Chinook helicopter and the squadron has 15 aircraft. Since this squadron is one of one, they must conduct their own training to generate aircrews and participate to all CAF training exercises requiring air support from the rotary wing fleet (i.e., ex. Maple Resolve). They must also support domestic operations and they also have deployed internationally. Furthermore, aircraft must also undergo periodic maintenance and normal wear and tear causes some aircraft to be grounded for some time. Although the official number of assets is 15, there will most likely never be that number of asset available to fly.

eight Chinooks is a drop in the ocean. It would be a simple task and it could be sustained for a long period of time due to the large size of the American military.

The example here is taken from the rotary wing fleet but would be the same with any fleets. As a result, the RCAF will therefore continue to engage in contribution warfare. As mentioned by Johnston et al., "Canada typically contributes forces to campaigns led by others."[18] This led therefore to a concept that was defined by then LGen Vance – contribution warfare.19 – The RCAF Future Air Operating Concept (FAOC) Functional Concepts (FC) also define how the RCAF can be relevant in its contribution in any future operations. [20]

Assumption 2. Canada's foreign policy will continue to align with the Five-Eyes community and alliances such as NORAD and NATO will continue to grow with all members embracing a liberal world order.

This assumption is critical to understand the required alliances for global security and the protection of Canadian national interests both at home and abroad. In SSE, there is a clear statement about the contribution of Canada's participation within coalitions. Essentially, the publication that "Canada must continue to be a responsible partner that adds value to traditional alliances, including NORAD, NATO, and the Five-Eyes community."[21] The recently released Canadian Indo-Pacific strategy is also a good example to demonstrate the need to align Canada's foreign policy with its closest allies."[22] The federal government has already pledged military assets and the document specifically mentions that [Canada will] "make meaningful contributions to the region's security and defence and enhance our defence and security relationships with regional partners and allies." [23] The Indo-Pacific strategy is clearly a testament of Canada's will to contribute to various coalitions and alliances. However, this contribution is limited in scope and reduced to Canada being a follower not a leader.

Canada will not likely lead a large international coalition for a long period of time. Although it is possible to have Canadian officers employed at the very top of the hierarchy of a

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[18] Paul Johnston et al., "A Canadian Approach to Command at the Operational Level," *Canadian Military Journal* 14, no. 4 (2014): 12, http://www.journal.forces.gc.ca/vol14/no4/PDF/CMJ144Ep6.pdf.The authors continue and mention that "The CAF is neither required nor able to generate military forces larger than army brigade groups or naval and air force equivalents, with the possibility of one deployable joint task force headquarters which could control combined forces up to the same level."

[19] *Ibid.*

[20] Canada. Defence Research and Development Canada. Royal Canadian Air Force (RCAF) Future Air Operating Concept (FAOC) Functional Concepts. Ottawa: DND Canada, 2017, 16.
As Jan Ångström notes in contribution warfare "also influences the planning for and conduct of wars". See Jan Ångström, "Contribution Warfare: Sweden's lessons learned from the war in Afghanistan," *The US Army War College Quarterly: Parameters* 50, no. 4 (2020): 13 https://doi.org/10.55540/0031-1723.2688

[21] Canada. Department of National Defence. Strong, Secure, Engaged: Canada's Defence Policy. Ottawa: DND Canada, 2017. 14.

[22] Government of Canada. "Canada's Indo-Pacific Strategy." Accessed March 29, 2023. https://www.international.gc.ca/transparency-transparence/assets/pdfs/indo-pacific-indo-pacifique/indo-pacific-indo-pacifique-en.pdf.
The strategy reads that "Canada is engaging in the Indo-Pacific in coordination with our partners" and that "many of Canada's closest allies, including the United States, the European Union, Germany, France, and the United Kingdom, have increased, or are considering increasing, their presence in the region […].

[23] *Ibid.*

coalition, it would be on a case-by-case basis.[24] Notwithstanding where Canadian military personnel would fit in the coalition, the contribution would fall in the category of contribution warfare. Applying the principle of contribution warfare to the RCAF therefore means Canada's air force being honest with its capacity, and then looking at what could be spared that is neither use for self-defence at home (NORAD mandate for example) or essential for training, and then committing assets and crews to a coalition. It also means looking at what the RCAF has now and considering if it is interoperable or not. Considering the cost of new airframes, it is understandable that the RCAF cannot compete with all other nations in terms of numbers of assets, thus restricting the RCAF's influence abroad.

Alliances such as NORAD and NATO have been proven resilient throughout the years. Canada should leverage those partnerships to adopt a more pragmatic approach when it comes to defining future military needs. Indeed, the idea of *working together* must be paramount while working on procurement project and capability development. For instance, the cost of maintaining a last-generation fighter force is enormous. Realistically, does the RCAF need to maintain a fighter force and if so, why? The RCAF maintains quick reaction aircraft that are at all times ready to take on a threat over the sky of North America, but the number and state of those aircraft are incomparable with those of the United States Air Force (USAF) that are, arguably, the ones defending the skies or North America.[25]

As Peter Gray mentions it in *Air Warfare*, "most operations are not just joint, but are combined with those of other nations."[26] The RCAF must therefore continue to find a way to be relevant within coalitions and alliances. The recent example of the USAF shooting down two Chinese balloons in North American skies is a great illustration of the required collaboration between the United States and Canada. As mentioned in an interview by the Deputy Commander of NORAD, LGen Alain Pelletier, "it was the first time that NORAD was taking kinetic actions against an airborne object in Canadian and American airspace."[27] The question if the RCAF would have been able to conduct the operation is relevant. The balloon was flying at an altitude

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[24] Op Unified Protector is a great example of leadership from a Canadian officer. This operation was also a demonstration that Canadian Officer have the level of professionalism and knowledge to lead a large, combined operation. In the spring of 2011, a multi-state coalition began a military intervention in Libya in response to events during the Libyan civil war. The United Nations Security Council Resolution 1973 was implemented to create a Libyan no-fly zone and to take all necessary measures to prevent attacks on civilians by the government forces of Colonel Muammar Gaddafi. The NATO Operation UNIFIED PROTECTOR formally began on 23 March 2011 and ended on 31 October 2011. This mission was commanded by a Royal Canadian Air Force officer, then LGen Charles Bouchard. See: Richard Mayne, "The Canadian Experience: Operation Mobile," Richard Mayne and William March, eds., *Air Wing: RCAF Commanders' Perspectives During the 2011 Libyan Conflict* (Trenton: RCAF History & Heritage, 2018), 1-26, https://publications.gc.ca/collections/collection_2018/mdn-dnd/D2-401-2018-eng.pdf

[25] United States, "Eielson Air Force Base", last accessed 7 May 2023, https://www.eielson.af.mil/About-Us/Units/ The 354th Fighter Wing is the host unit at Eielson Air Force Base, located 26 miles southeast of Fairbanks, Alaska. The 354th Fighter Wing mission is to provide "USINDOPACOM combat-ready airpower, advanced integration training, and a strategic arctic basing option. The USAF maintains F16D, F22, and F35 fighter as well as tanker and transport aircraft.

[26] Peter W. Gray, *Air Warfare: History, Theory and Practice* (London: Bloomsbury, 2016), 109.

[27] Sean Boynton, "Chinese spy balloon puts 'sharp focus' on why Canada must modernize military: MacKay," *Global News*, last accessed February 19, 2023, https://globalnews.ca/news/9495152/canada-military-china-balloons-russia-mackay/

of 60 000' while the operation ceiling of the Canadian CF-18 is 50 000'.[28] One of the main points of NORAD is that Canadian and U.S. military aircraft need not seek permission every time they need to fly over each other's territory and if kinetic action is required, American assets can use lethal force in Canadian airspace.[29] This example clearly illustrates the relationship between Canada and the United States where one can overfly the other. On the other hand, however, it also displays issues (the RCAF did not shoot down the balloons) that are ignored based on the assumption that the Americans will conduct operations on Canada's behalf if need be. Although this is how NORAD operates, it can affect the credibility of the RCAF if Canadian assets are unable to take kinetic actions in Canadian airspace. This rationalization comes at a cost that will be discussed at a later point.

Assumption 3. The RCAF will not grow to become a fully recognized medium power air force.

Preston argues that "often, air forces are either 'large,' like the United States Air Force (USAF), or 'small.'"[30] Based on its budget and available aviators, the RCAF will continue to be a small air force with the appetite of a medium air force. Mathew Preston offers a different system of classification for Air Forces and argues that the RCAF is a Tier 2. The definition provided for those air forces is that "they do not compromise on kinetic capabilities in their manned platforms, and all operate multirole fighters as their primary combat vehicle."[31] Tier 2 air forces are also defined by their lack of capacities and deficiencies: "major compromises occur in the size of their airlift capabilities; lack of dedicated air-to-ground platforms, dedicated interceptors or air-superiority aircraft; and a limited, if not absent, cruise missile or ICBM capability."[32] By this definition, the RCAF is clearly a Tier 2 air force and there is neither the money, the political will, nor the available aviators to make it grow.

Considering that the tier system of quantifying an air force is still new and has not been accepted or socialized yet, the term *small* air force will be used for this paper. Preston also mentions that "creating a definition and theoretical framework that is as applicable to smaller air forces as it is to large ones provides the ability to both assess the performance of all air forces and recommend suitable procurement, deployment and doctrine moving forward."[33] While visiting the Canadian Forces College for a Joint Command and Staff Program (JCSP) engagement, the Commander of the RCAF mentioned that the RCAF is agile, and its agility is based on the RCAF ability to accomplish multiple small missions.[34] This vision led to the

[28] Airforce Technology, "CF-18 Hornet Multi-Role Fighter Aircraft," last consulted 29 March 2023, https://www.airforce-technology.com/projects/boeingcf18hornetmult/
[29] *Ibid.*
[30] Mathew Preston, "Air Power Theory and Force Classification.*" RCAF Journal* 5, no. 3 (Summer 2016): 30.
[31] *Ibid.*
[32] *Ibid.*
[33] *Ibid., 37.*
[34] LGen Eric Kenny, "Royal Canadian Air Force" (lecture, Canadian Forces College, Toronto, ON, January 16, 2023), with permission.

acquisition of multiple platforms such as the future fighter capability project (FFCP), the strategic tanker transport capability (STTC) or the remote piloted aircraft system (RPAS).[35]

Quantifying and categorizing the RCAF is a useful exercise. It allows to identify gaps in capacities. As Preston notes, "in the current era, tier 2 air forces are focusing on high technology and multi mission capable aircraft."[36] The RCAF is assessed as tier 2 air force and the recent procurement announcements are high technology and multi mission capable aircraft, confirming Preston's argument and supporting the level of classification of the RCAF. Recent acquisitions have been to renew old fleets and did not specifically bring additional capabilities or future-oriented capabilities.

Defining the problem

Countries cannot necessarily buy the airpower that they need in good enough time.

P. Mathew, *Airpower for Strategic Effect*

Before a procurement project can be launched, there must be a need that is identified and well defined. The RCAF requires a raison d'être. "Delivering air power on behalf of the government of Canada" is too vast of a definition.[37] In a world where budget and aviators would be in unlimited supply, it would not be a challenge. This is not the reality the RCAF faces. The current construct of the RCAF aims at delivering air power on the full spectrum of operations. The newly released RCAF strategy mentions that the mission of the RCAF is to "generate relevant, responsive and effective air and space power at home and abroad."[38] The new strategy identifies four strategic objectives: value our people and invest in their future, ready to conduct operations, modernize for tomorrow and engage and partner for success.[39] Although this strategy identifies actionable items, it does not explain how the RCAF could or should achieve its mandate nor does it identify which activities should be a priority.

From a fighter jet program to a search and rescue (SAR) mandate, the RCAF is present on the full spectrum of operations. The RCAF has currently 17 % of its positions vacant.[40] This number is not considering the number of aviators that are on medical employment limitation (MEL) or on a maternity/paternity leave. While there is a lot of empty positions within the ranks, the demographic of the RCAF is also aging like the rest of the Canadian population.[41] Experience cannot be easily replaced and can certainly not be mass-produced rapidly.

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[35] Government of Canada, "Air Defence Procurement Projects", last accessed 7 May 2023, https://www.canada.ca/en/services/defence/defence-equipment-purchases-upgrades/air-equipment-procurement.html"

[36] Mathew Preston, "Air Power Theory and Force Classification." *RCAF Journal* 5, no. 3 (Summer 2016): 30.

[37] Government of Canada, "Mandate of the Royal Canadian Air Force," last accessed 6 May 2023, https://www.canada.ca/en/air-force/corporate/mandate.html

[38] Government of Canada, "Royal Canadian Air Force Strategy," last accessed 08 February 2023, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-strategy.html.

[39] *Ibid.*

[40] Government of Canada, Military Command Software, Personnel Dashboard available on the DWAN only.

[41] Government of Canada, "Population and demography statistics", last accessed 7 May 2023, https://www.statcan.gc.ca/en/subjects-start/population_and_demography

The advent of new technology could be a venue to alleviate certain pressure from the lack of personnel. To this day, the concept that "technology drives the doctrine"[42] is not universally accepted and subject to debate. However, small air forces will tend to follow and not lead when it comes to state-of-the-art technology resulting in a doctrine that follows the technology. As Kainikara mentioned, "air power characteristics [are] overwhelmingly reliant on technology for their effectiveness."[43] Acquiring the latest technology is costly and the RCAF is subject to strict budgetary restraint. Furthermore, it is now well documented that the procurement process within DND is slow and complex. Predicting future conflicts and what will be required to deliver air power early enough to shape and proceed with procurement projects would be the ideal.[44] It takes decades of negotiations in a whole of government (WoG) effort to bring a major procurement project to fruition.[45] Although it is possible to speculate on what future technologies will bring to the fight, it is important to refrain from finding solutions solely based on technology. The RCAF is too small of an air force to develop its own technology or airframe (with a few exceptions).[46] The RCAF must therefore buy what is available *on the shelf*.

To be relevant, an organization requires a goal. The RCAF must support all other commands to an acceptable level. Defining what is an *acceptable level* can be a complex task and will vary in time. As Colin Gray mentions, "it is absolutely necessary that the requirements for direct and indirect airpower support for land power and sea power be provided in ways and with means that reflect the respective realities and need of land and sea warfare."[47] Recent CAF operations illustrate this reality.

RCAF fighter jets were not employed in Afghanistan. From October 2014 to February 2016, the CF18 deployed to Kuwait in support of the American-led Operation Inherent Resolve (OIR). Following an election promise, the government withdrew the fighters from the area of operation (AO).[48] From a transport point of view, the CAF had to leverage civilian airliners to insert troops in theatre during the Afghanistan war. With only seventeen C130Js and five C17s, it

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The MCS dashboard, a tool available on DWAN also demonstrate that the number of available aviators to conduct day to day operations is not equal to the number of RCAF members. Although the number varies from unit to unit and varies within a year, it is expected that a certain number of aviators are not part of the fight for multiple reasons. Whether it is for injury, parental leave, long-term sickness or any other reasons, there will always be less aviators available to deploy or to work on base than the number of aviators on paper.

[42] Robert R. Leonhard, *The Principles of War for the Information Age* (New York: Ballantyne Books, 1998), 40.

[43] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 15.

[44] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 20.

Kainikara specifically states that the future of strategic environment will exert extraordinary pressure on small air forces to be able to defend national interests, if necessary, as an independent entity, while continuing to maintain the capability to operate within coalitions outside the geographic borders of the nation.

[45] Government of Canada, "Fixed-wing search and rescue procurement project", last accessed 7 May 2023.

As an example, the replacement project for the fixed wing search and rescue aircraft (FWSAR) was identified in 2002 and the close out is expected in 2025.

[46] Lockheed Martin, "CH-148 Cyclone Canada's Maritime Helicopter", last accessed 7 May 2023, https://www.lockheedmartin.com/en-us/products/sikorsky-ch148-cyclone-helicopter.html

An example is the CH148 Cyclone was design for the RCAF.

[47] Colin S. Gray, *Airpower for Strategic Effect* (Air Force Research Institute (U.S.), and Air University (U.S.). Maxwell Air Force Base, Ala: Air University Press, Air Force Research Institute, 2012), 278.

[48] Terry Milewski,"Justin Trudeau faces demands to break promise on ISIS bombing", *CBC News*, last accessed 24 January 2023, https://www.cbc.ca/news/politics/isis-bombing-cf-18s-trudeau-milewskie-1.3416472.

is easy to understand that the RCAF was not able to meet the request of air power from the land component. One notable exception was the Chinooks capability. A report of the Standing Senate Committee on National Security and Defence states that "the Chinooks' ability to operate in difficult conditions such as Afghanistan contributed significantly to the reduction in fatalities."[49] Furthermore, the report mentions that "prior to their [Chinooks] arrival, Canadians military personnel were compelled to drive through rugged, improvised explosive devices (IED) filled terrain."[50] However, there were not enough Chinooks: the Air Task Force (ATF) was not able to support all the mission requests it received and had to turn down requests for effect (RFE) on a daily basis. The land component clearly would have benefited from more available air power.

Whether it is for political reason, lack of assets, lack of aviators, budget constraints or any other valid (or not) reasons, the reality is that the RCAF barely meets its mandate. The RCAF official mission is to "provide the CAF with relevant, responsive and effective air and space power to meet the defence challenges of today and into the future."[51] By taking too many challenges at once, the RCAF is diluting the number of available aviators across the country on different fleets. Operating in silos, every capacity is hindered by constraints. As Goette observes, "the RCAF first needs to learn how to evolve beyond its operational community stovepipes, silos or 'little air forces' and integrate with itself."[52]

The RCAF is not the only forces trying to define the future and what it will take to be successful in future conflicts. In tomorrow's air force, Smith states that "considering the length of time required for research and development of specific technologies designed to meet external responsibilities, anticipating what the organizational of the USAF should be in the future is required – today."[53] This is an important statement applicable to the RCAF as well. With the invasion of Ukraine and the tension in the Indo-Pacific, the western world cannot assume that hegemonic power will remain the way it is now. There is a clear a return of great power competition with the rise of China and the return of Russia. The possibilities of a near-peer adversary conflict are getting real. In a recent annual meeting of China's parliament, Chinese leader Xi Jinping mentioned multiple times that China is getting ready to go to war.[54] As the odds are changing, military leaders must determine what future mission sets will look like and start shaping today's air force to be responsive to tomorrow's conflicts.

Defining the future of an air force is not an easy task. Colonel Champagne stated in *The Art of Air War* that "the preparation and execution of an air campaign are complex."[55] Col Champagne also argues that air "battle's consistency relies on the implementation of varied and

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[49] Senate of Canada, "Reinvesting in the Canadian armed forces: a plan for the future," last accessed 10 March 2023, https://sencanada.ca/content/sen/committee/421/SECD/reports/SECDDPRReport_FINAL_e.pdf.
[50] *Ibid.*
[51] Government of Canada, "Mandate of the Royal Canadian Air Force," last accessed 08 February 2023, https://www.canada.ca/en/air-force/corporate/mandate.html
[52] Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations* (Trenton, ON: Royal Canadian Air Force Aerospace Warfare Centre Production Section, 2020), 81
[53] Jeffrey J. Smith, *Tomorrow's Air Force: Tracing the Past, Shaping the Future*. (Indianapolis: Indiana University Press, 2014), 4.
[54] John Pomfret and Matt Pottinger, "Xi Jinping Says He's Preparing for War," Foreign Affairs, 5January, 2021, accessed March 29, 2023, https://www.foreignaffairs.com/united-states/xi-jinping-says-he-preparing-china-war.
[55] Régis Chamagne and Richard Wolsztynski, *The Art of Air War* (Lingolsheim: Histopresse, 2006), 181

complementary assets whose employment must be synchronized."[56] What is apparent is sometime as important as what is missing while analyzing a statement such as this one. Colonel Champagne praises the aspect of the integration of the air force. What is missing from the observation is *where* those assets are coming from.

As described later in this text, only the United States can sustain full spectrum operations for a prolonged period and without allies on (debatable) two fronts at the time. Colonel Champagne spent his career as a fighter pilot in the French Air Force. France does not have the same capacity that the United States, but they have proven many times – especially in Africa – that they can handle significant operations on their own. Despite what France has accomplished on the African continent, they could not have reproduced what that Americans have done in the Middle East. When Colonel Champagne mentions the implementation, synchronization, and employment of varied and complementary assets, he really means the role of a CAOC[57]. He fails to mention that those assets would most likely be coming from different countries within a coalition, making it a combined and joint operation. The ripple effect from this assessment is the underlying truth that if a coalition is formed from various assets to be a fully functional system with all required effects available, there is therefore no need for all countries to be able to provide the entire spectrum. If we picture an air coalition like a puzzle, each country will provide certain pieces that have to fit into another (interoperability) to form a cohesive and complete puzzle (full spectrum of operation). Since all (except the U.S.) are incapable of supplying all the pieces, it seems appropriate for each participating ally to develop an expertise (niche capability) and grow into a reliable coalition partner renowned for this expertise.[58]

The pilot's bias.

For years, the RCAF has been run by pilots.[59] If the RCAF has a bias toward who should oversee the air force, the USAF has the same issue with the fighter pilot community.[60] Air power is not just a matter of how a pilot can fly an airplane and how tactically sound an operator is. With technology consistently emerging within the pan-domain spectrum, it is important to select current leaders based on a variety of factors and not solely based on a military occupation. As Gray mentioned, "familiarity breeds an overfamiliarity that discourages critical intelligence."[61] Although this paper is not about leadership, it is important to understand some biases that could lead the senior leadership to steer the RCAF in a certain direction. As Smith mentions, "if most officers believe that only certain types of operational specialties are promoted to the highest ranks regardless of whether others have superior airpower thinking capability, then the idea of a

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[56] *Ibid., 182.*

[57] The role of the CAOC is later explained in more detail.

[58] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 21.
Kainikara states that Air and Space power is capable of producing a very large spectrum of effects, however, their relative importance and, therefore, the priority accorded to the capability development needed to create a particular effect will be determined by the emerging strategic environment. An effects-based approach to the employment of air power will necessitate an essential overlap of different capabilities.

[59] With only two exceptions: LGen (Ret) Hood and LGen (Ret) Lucas

[60] Jeffrey J. Smith, *Tomorrow's Air Force: Tracing the Past, Shaping the Future*. (Indianapolis: Indiana University Press, 2014), 157.

[61] Colin S. Gray, *Airpower for Strategic Effect* (Air Force Research Institute (U.S.), and Air University (U.S.). Maxwell Air Force Base, Ala: Air University Press, Air Force Research Institute, 2012), 69.

'glass ceiling' develops."[62] The graph below depicts a study that was done for the USAF regarding the role of fighter pilots in senior leadership position. The results are clear. There is a very distinct dichotomy in how officers perceive senior leadership roles. On one side, most of the fighter pilots clearly believe that they should be in charge while the rest of the officer (non-fighter pilots and other trades) have a different opinion.[63]

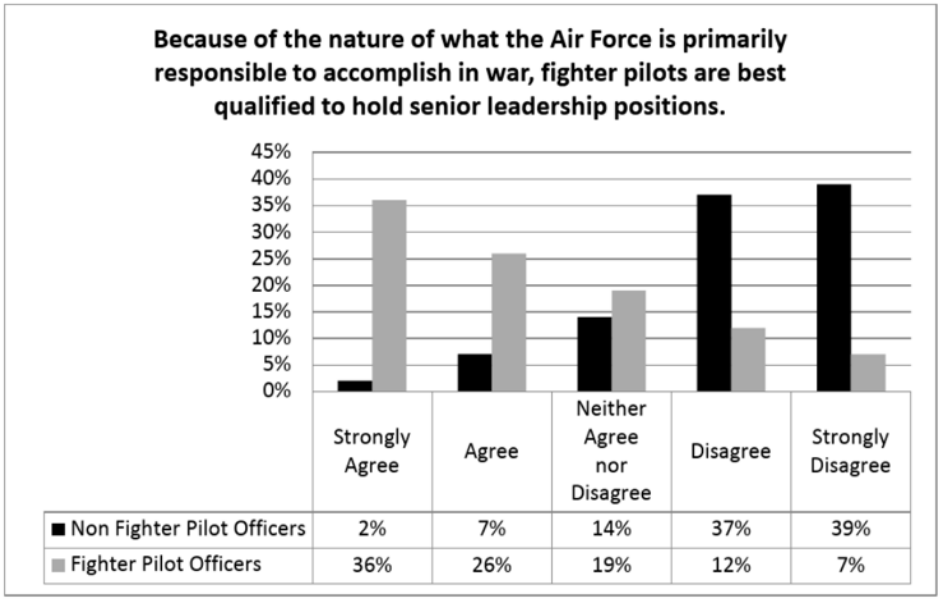

Figure 2.1 Leadership role of fighter pilots

Source: Smith, Jeffrey J. Tomorrow's Air Force: Tracing the Past, Shaping the Future, 177.

In his book *The Icarus Syndrome*, Carl Builder mentions that "[t]he aviators might have recognized that technology would eventually provide alternative, competitive means, alongside the airplane, to fulfill the ends of the air power theory. However, they [fighter pilots] tried to deny that possibility."[64] Builder's study culminates by demonstrating that most officers believe that the USAF will undergo significant organizational change.

The RCAF is not much different went it comes to culture than the USAF. The *pilot mentality* is real. Within that culture exists other subcultures such as the fleet association. In *The Human Dimensions of Expeditionary Air Force Operations*, English and Col Westrop mention that "problems in air force leadership and command have been attributed to the 'stovepipes' in which many air force personnel find themselves for much of their careers."[65] As the authors explain, a person might remain in a certain role or community for a major part of their career and

[62] Jeffrey J. Smith, *Tomorrow's Air Force: Tracing the Past, Shaping the Future*. (Indianapolis: Indiana University Press, 2014), 178.
[63] *Ibid.*
[64] Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force* (Somerset, Taylor and Francis group, 2017), 36.
[65] English, Allan and John Westrop. *Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2007), 156.

lack the exposure to the greater RCAF leading to a "stovepipe" mentality. English and Westrop note that "these stovepipes are caused by the distinct roles, missions, equipment and operating environment of each air force community and these factors give each community a unique culture."[66] To progress and embrace the challenges of the future, small air forces must be flexible, despite culture and subcultures. Flexibility is the key to air power. Having the right person in the right seat is more important than protecting subcultures. As demonstrated by then Maj M. Snook, "to meet the complexities of war by providing responsive, relevant, and effective airpower, it will be essential for the RCAF to operate at its maximum operational potential […] by opening its key leadership positions to all air force occupations[...]", not just pilots.[67]

Future air forces cannot be seen just as more modern aircraft. The RCAF is involved in space, cyber and communication more than ever, and this is only the beginning. To be relevant, the RCAF must accept that maybe the future of the air force is not destined to be within the hands of a pilot. As mentioned by Preston, "small air forces cannot create mass. This, however, does not prevent them from acting strategically."[68] To act strategically, a small air force must be able to deliver a desired effect within a coalition or in support of the local government. The choices the RCAF will have to make in the next decades will have impacts of the next 50 years. It is paramount that culture does not overly influence those choices.[69]

Conclusion

This first chapter introduced the CAF's reconstitution efforts as an opportunity to promote positive changes but most importantly, to try something new and bold. The demonstration that the RCAF is a tier 2, or small air force, was also presented using two different categorization methods. Based on its size alone, the RCAF is very likely to conduct contribution warfare leading to the utmost importance of being interoperable with Canada's allies. This chapter offers three assumptions to better understand how the future of the RCAF can be shaped today to answer tomorrow's demand of air power. The next chapter will introduce air transport as the first potential niche for the RCAF.

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[66] Ibid., 157. The authors also argue that tt is, however, impossible to come up with a perfect definition of the RCAF approved by all culture as "stovepipe varies according to one's point of view".
[67] Maj M. Snook, *RCAF leadership and the cult of the pilot: reassessing a WWII organizational structure* (Canadian Forces College, 2018), 6.
[68] Mathew Preston, "Air Power Theory and Force Classification." *RCAF Journal* 5, no. 3 (Summer 2016): 30.
[69] Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force* (Somerset, Taylor and Francis group, 2017), 36.

CHAPTER 2 - TRANSPORT

> *Robust strategic airlift capabilities are vital to ensuring that NATO Allies are able to deploy their forces and equipment rapidly to wherever they are needed.*
>
> North Atlantic Treaty Organization, *Strategic Airlift*

Introduction

This chapter discusses the importance of military airlift for domestic and expeditionary operations. It also presents key data to understand the significant challenge for the CAF to project forces abroad due to the distance between the home staging bases and the various theatres of operations. A quick overlook at the how NATO manages airlift is also presented as well as some of the NATO programs in place to overcome the shortcoming of assets. Finally, this chapter introduces the *transport role* as the first potential niche capability for the RCAF.

The Need for Transport

As mentioned in the U.S. Joint publications 3-17, Air Mobility Operations, "airlift is a cornerstone of global force projection."[70] The RCAF Capstone document defines airlift as "the transport and delivery by air of personnel and materiel in support of strategic, operational, or tactical objectivity."[71] The Canadian doctrine mentions that airlift provides a military commander with the ability to move equipment or personnel quickly and over a great distance.[72] The sustainment of deployed forces can generally only be done via airlift as well. Whether it is strategic or tactical airlift, this is a core air power capability required for the full spectrum of operations.

Airlift is also a key joint enabler. From a Canadian point of view, jointness is engraved in strategic affairs, policies, doctrine, directives and in the way that the CAF are conducting operations and exercises. As Gray alluded to, "the maturing of airpower necessarily has translated as a growing importance relative to, and functioning synergistically with, land power and sea power."[73] Jointness, however, is done a little differently in Canada. The CAF is structured differently than the U.S. Army, U.S. Navy, U.S. Air Force (USAF) and Marines Corps whereas all flying assets (other than small RPAs) are owned and operated by the RCAF. The Royal Canadian Navy (RCN) or Canadian Army (CA) do not have the capability to airlift personnel or equipment. It is therefore a RCAF task to provide air transport. As mentioned in RCAF doctrine, "CAF air power is unique from that of many of Canada's allied and coalition

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[70] United States. Department of Defense, *Joint Publication 3-17, Air Mobility Operations* (Washington, DC: U.S. Government Printing Office, February 5,2019), 5-1

[71] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016, 35.

[72] *Ibid.*

[73] Colin S. Gray, *Airpower for Strategic Effect* (Air Force Research Institute (U.S.), and Air University (U.S.). Maxwell Air Force Base, Ala: Air University Press, Air Force Research Institute, 2012), p.76.

partners in that the evolution of Canada's military has established the RCAF as the sole element responsible for all air power capabilities within CAF".[74]

RCAF doctrine on sustainment confirms the importance of this role in a joint environment.[75] The RCAF operations are therefore and inherently joint in nature (although some operations are RCAF centric, they are the exceptions and not the norm). Considering *reach*, *speed,* and *payload*[76] – three important characteristic of air power - the need for airlift is critical to any mission conducted by the CAF. If the RCAF is not able to airlift on time, on target and at the desire rate, there are significant impacts at the tactical level all the way to the strategic level. Speed is a characteristic that is well understood by decision makers and for this reason, the RCAF (and CAF as a whole) has been used many times over the last decade for domestic operations.

Technically supposed to be a force of last resort and in support of a lead domestic agency, the CAF have been front and centre on many domestic operations.[77] According to the doctrine, the "RCAF support to joint operations and the civil power is fundamental and essential."[78] The RCAF owns assets and capability that are not accessible to civilian agencies (or very limited). Although some equipment is designed for wartime operation, some have a dual use when it comes to aid to civil power. As an example, the forward-looking infrared camera (FLIR) is most of the time used for ISR but could also be used to find a lost person on a trail hike.[79] The RCAF doctrine also mentions that the "RCAF air power in support to the civil power recognizes the fundamental responsibility of CAF to help secure Canadians at home and abroad."[80] SSE mentions that the CAF must be present at home. Although it is expected that the RCAF will engage in domestic operations, it comes at a cost. Part of it is the actual dollar figure while the other one is the cost opportunity. To deploy aviators and assets on a domestic operation, something else must give.

Recently, senior military leaders challenged the increasing use of the CAF for domestic operations. Nevertheless, as the CDS stated during a news interviews, the CAF should expect to continue to be frequently employed for domestic operations.[81] During humanitarian aid and disaster relief operations, the senior leadership, both at the political and military level, is expecting rapid results. The CAF must carefully balance the political desirable effect vs. the required military outcome. Following a humanitarian disaster, the image of grey tails landing at an airport nearby will immediately signal to the local population that help is coming and from a

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[74] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016), 41.
[75] *Ibid., 79.*
[76] *Ibid., 14.*
[77] Domestic operations are always led by a provincial agency and the CAF are supporting those agencies. There is a formal procedure for the provinces and territories to request assistance (RFA) that is dealt at the ministerial level. Only when the CAF received an official tasking that they may partake in domestic operations.
[78] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016), 41
[79] Teledyne FLIR, "Acute Vision for Life-Saving Missions", last accessed 07 may 2023, https://www.flir.ca/surveillance/search-and-rescue/
[80] *Ibid.,* 43.
[81] "Demand for CAF in domestic operations rising as more troops deployed to Fiona-hit areas." *CBC News*, October 2, 2022, last accessed 13 March 2023, https://www.youtube.com/watch?v=W1BMZCTXv6Q

political point of view it means reassuring the population by demonstrating that the government is willing to help. In one *RCAF Journal* article, Goette describes how the "positive effect of non-kinetic air power is a proud characteristic of the RCAF."[82] Indeed, the RCAF delivers emergency aid, rescue capabilities, supplies, etc. This form of *gentler* air power suggests the end of suffering, an increase in comfort and a general positive psychological impact.[83] However, these grey tails need to exist, must be crewed and in an operational state if they are not already committed to another mission. The RCAF must carefully assign the number of grey tails per mission (both in the FE and force generation (FG) role[84]) since the current fleet is not large enough to contribute to multiple large missions at once.

The current RCAF transport fleet is as follows[85]:

Aircraft	Number	Location
A310 Polaris	3 (transport) + 2 (tanker)	CFB Trenton
C17 Globemaster	5	CFB Trenton
C130J Hercules	17	CFB Trenton
DHC-6 Twin Otter	3	Yellowknife
CC144 Challenger	4	Ottawa

Figure 3.1 Current RCAF fleet
Source: Royal Canadian Air Force aircraft (https://www.canada.ca/en/air-force/services/aircraft.html)

In 2012, France launched a mission in Mali to overthrow Islamic militants. Rapidly, French planners realized that air mobility was a challenge. MGen Tramond and LtCol Seigneur clearly indicate that "allied contributions helped bridge the gap in strategic and tactical transport aircraft at the beginning of Operation Serval."[86] Antoine D'Evry makes the same observation in

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[82] Richard Goette, " The Positive Psychological Effect of Air Power," *RCAF Journal* 15 no. 4 (2015), https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-journal/2015-vol4-iss3-07-the-positive-psychological-effect-of-air-power.html

[83] *Ibid.*

[84] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Command and Control* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016, 55.
The RCAF doctrine defines Force Employment as force employment at the strategic level as the application of military means in support of strategic objectives. At the operational level, it is defined as the command, control, and sustainment of allocated forces. The RCAF doctrine defines Force Generation as the process of organizing, training, and equipping forces for force employment.

[85] Flight International. "World Air Forces", accessed January 14, 2023. https://www.flightglobal.com/download?ac=83735
The description of each aircraft as well as their fleet association and utilization can also be found outline on the Government of Canada (Royal Canadian Air Force) webpage but the latest number of asset was missing. The description of each aircraft can be find online at: https://www.canada.ca/en/air-force/services/aircraft.html

[86] Tramond, Maj. Gen. Olivier, and Lt. Col. Phillippe Seigneur. Early Lessons from Frances Operation Serval in Mali. Army (June 2013), 43.

L'Opération Serval à l'épreuve du doute where he candidly mentions that the French Air Force has a major deficiency in strategic airlift.[87] D'Evry continues and states that in order to ship armoured vehicles and heavy equipment, France had to leverage their diplomatic relations from allies to secure strategic airlift.[88] Still, this was not enough, and France had to secure airlift from the private sector. IL-56 and AN-124 were chartered at a huge cost from Ukraine and Russia. With today's geopolitical situation, this would not be possible and therefore the strategic airlift would have to come from somewhere else. The graph below illustrates some distances between bases or hubs that the RCAF has used or still uses to conduct operation.[89] As a comparison tool, the distance between Paris (LFPG) and Bamako (GABS) is used as a baseline.

Location	Location	Distance
Paris (LFPG)	**Bamako (GABS)**	2252 nm
Trenton (CYTR)	**Cologne (EDDK)**	3273 nm
Trenton (CYTR)	**Glasgow Prestwick (EGPK)**	2770 nm
Cologne (EDDK)	**Paphos International (LCPH)**	1466 nm
Cologne (EDDK)	**Ali Al-Salem (OKAS)**	2218 nm
Ali Al-Salem (OKAS)	**Kabul International (OAKB)**	2300 nm
Trenton (CYTR)	**CFS Alert (CYLT)**	2324 nm

Figure 3.2 Flight distances
Source: https://airplanemanager.com/

The data contained in this table are significant and must be considered by planners before the conduct of any operation. The distance between Paris and Bamako is less than the distance between CFB Trenton and hubs in Europe. It is similar in distance to a flight from CFB Trenton to CFS Alert. Canada is the second-largest country in the world and projecting forces within the country can be challenging. Operating in the Arctic is becoming more important and the CAF must become agile in this harsh environment. As stated in SSE, "the Arctic region represents an important international crossroads where issues of climate change, international trade, and global security meet."[90] The document also mentions that "Canada's contributions to regional Arctic

[87] D'Evry, Antoine. L'opération Serval à l'épreuve du doute, vrais succès et fausses leçons. Focus stratégique 59 (July 2015), 31.
[88] *Ibid.* Canada was part of the operation as well as the U.S. but many countries were trying to stay away from a long-term engagement.
[89] The distance between location was obtained using Airplane Manage available online at https://airplanemanager.com/. The data obtained are not reflecting an actual flight route but a direct distance between the two locations (except between OKAS and OAKB where extrapolation was required to avoid "flying" over Iran and a more realistic route was calculated). The distance depicted in the graph is a minimum distance.
[90] Canada. Department of National Defence. Strong, Secure, Engaged: Canada's Defence Policy. Ottawa: DND Canada, 2017.

security form a core part of the Canada-United States defence relationship."[91] The policy clearly states that each element must enhance their present on the long term but also increase their knowledge of the north and proficiency at operating in those conditions. For the RCAF, SSE was the key to unlock procurement projects.[92]

Despite those new procurement projects, the RCAF requires infrastructure to effectively operate in the Arctic.[93] As mentioned by LtCol Bacot (USAF) "one of the biggest challenges facing the Canadian Forces is to deploy its units and formations off-continent and then to sustain them."[94] LtCol Bacot is not wrong but could be (more) right by integrating *arctic operations* in its remarks. Indeed, the CAF presence in the North will increase thus driving the RCAF to airlift more frequently to more remote location. Nevertheless, the RCAF will have to find a way to operate in the Arctic as the threat continues to evolve whether it is in the realm of states competition, the influence of non-state actors or natural disaster.

Considering the challenges of deploying within the country, it is not a surprise that deploying personnel and/or equipment on another continent can be a complicated endeavour. Deploying in an austere environment adds to the challenge since additional planning factors must be considered such as force protection, refueling availability, crew swap, etc. As mentioned by then LCol Girouard, "[e]xpeditionary sustainment operations are inherently complex, and that complexity is inevitably compounded by external factors which challenge the ability of deployed support organizations to enable mission success."[95] The sustainment doctrine at the joint level does not necessarily match the doctrine at the tactical level.[96]

Given that strategic airlift is controlled by the CAOC, conflicts intra-theatre may rise quickly if one does not have a good understanding of the other's doctrine. The support and sustainment doctrine cannot account for all situations and as mentioned by then LCol Girouard, future leaders should receive "exposure to environmental and joint sustainment doctrine as often as possible through collective training events and exercises as well as other professional-development opportunities [in order to] find flexible solutions to complex problems in the volatile and complex operating environments."[97] Departing from the doctrine is generally not recommended, but sometimes, tactical situations dictate otherwise. The evacuation of Kabul in the summer of 2021 is an obvious example were leaders at the tactical level had to make decisions against RCAF doctrine.[98] Op AEGIS was an extreme situation where the strategic level had direct inputs at the tactica1level and where the operational level was compressed to a point where they became irrelevant.[99] Those who depart from the doctrine must first understand the

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[91] *Ibid.*
[92] Multiple procurement project followed the publication of SSE. Space capabilities, TIC3, net generation air-to-air tanker-transport, medium altitude remotely piloted systems, ISR equipment and platforms, etc.
[93] One of the major problems is the lack of hanger capable of housing a C17, A310 or C130J. Another obstacle to the hub and spoke concept of operation is the large distance between the airfields.
[94] Roy C. Bacot." Global Movements and Operational Support Hub Concept: Global Reach for the Canadian Forces." *The Canadian Air Force Journal*, 2, no 3 (summer 2009), 9.
[95] Luc Girouard, "The Fusion of Doctrines: A Discussion of Sustainment Operations During Operation Impact." *RCAF Journal* 7, no. 1 (Winter 2018), 33
[96] *Ibid.*
[97] *Ibid.*
[98] Author's personal experience.
[99] *Ibid.*

doctrine. Second, they must intelligently justify why they are breaking it and lastly, they must propose amendments to their current doctrine as required. Flexibility and agility (key air power characteristics) must not be mistaken for a lack of assets and personnel. Having a small air force has the advantage of developing deeper personal relationships with colleagues given that there are not that many, that can it turn means that RCAF aviators might be more inclined to allow for personal favours. Those favours shall not be interpreted as voluntarily breaking rules or gaining a personal advantage but rather finding a way to enable operations that would have been otherwise complicated. In other words: removing unnecessary red tape.

Another important characteristic of air power is fragility. Essentially, the doctrine states that aircraft require more maintenance than land vehicles and the maintenance must be conducted by different specialists.[100] The number of assets presented above is not a testament to what is always available to the Joint Forces Air Component Commander (JFACC). Cyclical maintenance is required and will withdraw assets from the flight line. At any given moment, a certain percentage of the fleet will be unavailable. Maj Bishop explains that "[due to the] current aircraft's age and stay in usage longer than expected, it has become a reality to ensure civilian and military aviation institutions embrace new methodology to ensure the continuation of airworthiness and safety of flight".[101] Although technology can help to alleviate some airworthiness challenges, aircraft are becoming more and more complex with additional systems that require specialized technicians to install and maintain them.[102]

Having the minimum necessary number of aircraft is a dangerous gamble. The latest decades of conflict provided a theatre of operation within which RCAF assets could enjoy air supremacy. The new conflict in Eastern Europe and the tension rising in the Indo-Pacific would not allow the same level of freedom and attrition would have to be taken into consideration by planners. As mentioned in the doctrine, "gaining control of the air is normally afforded the highest priority in any military operation."[103] As demonstrated earlier, the projection of forces by the CAF is a complicated challenge. If the RCAF is maintaining the bare minimum of assets to meet its mandate, there is a legitimate question to ask if the mandate could be met in a conflict requiring additional Canadian forces personnel on two fronts with a (near) peer enemy. Fragility is an important characteristic of air power that must be well understood by senior planner, especially in a joint environment. Turnaround time of aircraft, the required preventive maintenance and other "ground delays" are necessary to ensure the flight safety.

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[100] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Command and Control* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016, 35.

[101] Sylvestre Bishop, "Aircraft Maintenance Within the Twenty-First Century RCAF" (Joint Command and Staff Program Paper, Canadian Forces College, 2019), 48.

[102] *Ibid, 49.*

Historically, decisions for maintenance had to be done post-landing There is a shift in maintenance philosophy [that is] already embraced by the newer aircraft such as CC-177 Globemaster and CC-130J Hercules, where constant communication between the aircraft, its operating systems, and the ground via satellite means, can provide real-time information on the aircraft serviceability. The challenge is that often maintenance decisions are taken only once the aircraft has landed and the troubleshooting activities have taken place. With real-time decision being taken, the parts could already be order, and maybe received in the hand of the maintenance team receiving the aircraft landing.

[103] Department of National Defence, B-GA-400/FP-001, *Royal Canadian Air Forces Doctrine* (Trenton: Canadian Forces Aerospace Warfare Centre, 2016), 32.

The characteristics of air power presented in the RCAF doctrine are not exclusive to the RCAF. To some extent, air forces from every country face the same challenges and the order of importance of those characteristics are not necessarily the same. As an example, smaller countries would probably not consider reach and speed as critical for domestic operation while they are paramount for Canadian domestic operations. For countries facing the same challenges (within alliances or ad hoc coalition), the key to success resides in collaboration, lessons learned sharing programs and capability sharing. Collaboration can take different forms, from exchange officers to a shared training centre. The NATO Flying Training Center (NFTC) located in Moose Jaw is a great example of sharing knowledge and training facilities within alliances.[104] The requirement for strategic airlift is required by all nations willing to conduct operations and therefore can be evaluated using the concept of absolute advantage.[105] The solution is to share resources and to specialize in capabilities in which the country has the advantage. Advantages can present themselves in various forms: monetary, technology, military-industrial complex, political will, historical background, geographical location, etc. NATO airlift also offers important insights.

NATO and Airlift

The RCAF, and the French Air force as demonstrated earlier, are not the only organizations struggling with its air mobility. In the journal of the *Joint Air Power Competence Centre*, Maj Lee states that Europe's current strategic airlift shortfall is significant.[106] Written before the Russian invasion of Ukraine, Maj Lee argued that "given capabilities, initiatives and priorities stated by NATO and the EU, a substantial gap exists between what is available and what is desired."[107] Maj Lee analyzed three potential theatres for deployment – the Bahamas, Rwanda, and Mali – in which the CAF have deployed in the past. The results of the study demonstrated that the requirement for each theatre exceeded the total number of available

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[104] Government of Canada, "15 Wing Moose Jaw", last accessed 7 May 2023, https://www.canada.ca/en/air-force/corporate/wings/15-wing.html
15 Wing is the centre of Royal Canadian Air Force aircrew training and is under the operational command of 2 Canadian Air Division. 15 Wing is the principal site of the NATO Flying Training in Canada (NFTC) and Contracted Flight Training and Support (CFTS) programs. Since October 2015, CAE has been the prime contractor responsible for the NATO Flying Training in Canada (NFTC) program that produces qualified military pilots for defence customers. The NFTC program significantly enhances CAE's core capabilities as a global training systems integrator (TSI) and expands its offering into support for live flying training of future military pilots, including next-generation fighter pilots, for the Royal Canadian Air Force and its allies.

[105] Daniel M. Bernhofen and John C. Brown, "Retrospectives: On the Genius Behind David Ricardo's 1817 Formulation of Comparative Advantage," *The Journal of Economic Perspectives* 32, no. 4 (2018): 227
David Ricardo was a British economist who develop the concept of absolute advantage. His theory was used for international trade and describes how certain countries can profit from trading with other countries given they have an absolute advantage in producing a particular good. A country can produce that good more efficiently than another if they use fewer resources or if they can produce it at a lower cost. In the example of airlift, Canada could airlift other troops into conflict zones and gain credibility on the international scene while maintaining a lower level of risk. For other countries willing to accept more political risk, this would be beneficial since developing and maintaining an air mobility fleet is expensive and complex. Canada would trade an expensive asset to maintain and operate against risk (political and military).

[106] Lee Hages, "*Europe's Strategic Airlift Gap Quantifying the Capability Gap and Measuring Solutions,"* The Journal of the Joint Air Power Competence Centre, 19 (Winter 2014): 24 last accessed 15 March 2023, https://www.japcc.org/wp-content/uploads/JAPCC_Journal_Ed-19_web.pdf.

[107] *Ibid.*

transport assets currently owned and operated by the RCAF.[108] This simulation exercise confirmed the earlier assumption - the RCAF will always be operating within a coalition for any major operation.[109] NATO is aware of its lack of strategic airlift as demonstrated by the different program in place to alleviate the problem.

Strategic Airlift International Solution (SALIS)

SALIS, a multinational consortium of nine countries, "provides assured access to up to five AN-124-100 aircraft (three of them mission-ready within a few days in case of crisis, and an additional two subject to availability) in support of national, NATO and EU operations and missions."[110] The participants are Belgium, Czechia, France, Germany, Hungary, Norway, Poland, Slovakia, and Slovenia. As per the NATO agreement, the "consortium countries have committed to using the aircraft for a minimum of 1,500 flight hours per year. In 2021, a total of 3,174 flight hours were provided through the SALIS contract."[111]

The mechanism to task those assets is comparable to the role of the Air Mobility Division (AMD) within the Combined Aerospace Operations Centre (CAOC) in Winnipeg where "the capability is coordinated on a day-to-day basis by the Strategic Airlift Coordination Cell (SACC), which is co-located with the Movement Coordination Centre Europe (MCCE) based in Eindhoven, the Netherlands."[112]

Strategic Airlift Capability (SAC)

In order to alleviate the strategic airlift shortfall identified by Maj Lee, NATO went forward with a second initiative "aimed at providing NATO Allies and partners with access to

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[108] *Ibid.*

[109] The demonstration that the CAF can only do contribution warfare was made in the earlier chapter.

[110] North Atlantic Treaty Organization, "Strategic Airlift," last accessed 03 April 2023, https://www.nato.int/cps/en/natohq/topics_50107.htm

[111] Ibid.

[112] Ibid. In June 2003, NATO defence ministers signed letters of intent on strategic air and sealift. In January 2006, 15 countries tasked the NATO Maintenance and Supply Agency (now the NATO Support and Procurement Agency) to sign a contract with Ruslan SALIS, a joint venture between the Russian company Volga-Dnepr Airlines and the Ukrainian company (formerly) Antonov Design Bureau, based in Leipzig, Germany. In March 2006, the 15 original signatories were joined by Sweden at a special ceremony in Leipzig to mark the entry into force of the multinational contract. This also marked the launch of the Strategic Airlift *Interim* Solution (SALIS) initiative in order to ensure strategic airlift for consortium countries until a long-term procurement solution could be found. The contract's initial duration was for three years. Finland and Poland also joined the SALIS program. The SALIS contract was re-competed in 2012, and Ruslan SALIS GmbH was awarded a new contract (2013/2014). The SALIS contract was renewed and then expired at the end of December 2016. At the end of 2016, SALIS countries signed a memorandum of understanding which established the Strategic Airlift *International* Solution as a consortium with 10 countries. In December 2016, the NSPA placed two contracts with two companies based at Leipzig-Halle Airport (Antonov SALIS GmbH and Ruslan SALIS GmbH), assuring access to strategic airlift capability for outsized cargo based on agreed quota of flying hours per year. These contracts expired on 31 December 2018. Since January 2019, Antonov Logistics Salis is the sole contractor providing assured access to strategic airlift capabilities to the current participating countries. In September 2019, the new SALIS Base of Operations was inaugurated at the Antonov Logistics Salis facilities at the Leipzig-Halle airport, marking full operational capability of the new SALIS Base of Operations. In October 2021, a new contract was signed between the NSPA and Antonov Logistics Salis. The contract was amended in May 2022, further to the impact of the Russian invasion in Ukraine on the fleet availability and its maintenance capability.

strategic airlift."[113] This program is the "Strategic Airlift Capability (SAC), which has procured three Boeing C-17 transport aircraft on behalf of a group of ten NATO Allies and two partner countries."[114] Configured and equipped to be interoperable with the USAF, the same standard are also applied to maintenance than the C-17s operated by the US Air Force although "crews and support personnel are trained for mission profiles and standards agreed by the countries."[115] Primarily designed to meet national requirements, those aircraft can also be tasked in support of NATO or other coalition operations as seen in 2021 during the evacuation of Kabul, Operation Unified Protector in Libya or multiples humanitarian and disaster relief operations.

The RCAF Within NATO

It is very unlikely that Canada would join SALIS or SAC. The required flying hours to preposition an asset to a Canadian base to then fly to a far destination would simply make the program ineffective. European countries have the luxury (or misfortune if we recall history) of being close to one another. Therefore, in a combined and joint operations, there is the possibility to leverage strategic airlift from an ally. Canada does not have this luxury. However, as an integral member of NATO, increasing Canada's number of available flying hours to its international partners would be welcoming news and reaffirm Canada's position towards NATO. In response to the Russian invasion of Ukraine, the RCAF had to reshuffle assets. It resulted in the "enduring Tactical Airlift Detachment (TAL det) under Op IMPACT […] to be reduced to episodic support in response to a surge in airlift demands across other locations, which requires the consolidation of air assets to fewer deployed operating hubs."[116] There is no great strategy behind this move.

The reason why Glasgow Prestwick is now used as the main hub for the Middle East is simply the lack of assets. The same aircraft is now used to resupply Ukrainian forces and to conduct operation in the CENTCOM AOR. This reshuffle of assets should not be seen as a concentration of force, economy of effort or an increase in flexibility. Ukrainians alone could not have faced Russia. They required assistance from the western world. Following the invasion, the RCAF immediately committed airlift capabilities. The domino effect of committing to another theatre was the removal of an asset from the Middle East, changing from an enduring mission to an episodic mission. The lack of assets leads to this new posture. As mentioned by the CDS in a new interview, "[w]hat we have done is consolidated in Scotland our C-130 tactical air detachment to be able to provide that support to Ukraine within Europe [and] to episodically provide support in the Middle East, and as well episodically provide support in Africa."[117] The impact of the RCAF within the world is now dissolved within three different theatre of operation. In the same news article, David Perry, a defence expert, mentions that "[w]henever there's an international crisis, airlift is always in short supply."[118] Perry also stated that "[the situation in

[113] North Atlantic Treaty Organization, "Strategic Airlift," last accessed 03 April 2023, https://www.nato.int/cps/en/natohq/topics_50107.htm
[114] Ibid.
[115] Ibid.
[116] Government of Canada, *Operation Impact*, last accessed 27 March 23, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-impact.html
[117] Murray Brewster, "Canada is moving military air transports from Kuwait to U.K. to support Ukraine Social Sharing", *CBC News,* last updated 25 August 2022, https://www.cbc.ca/news/politics/airlift-kuwait-ukraine-c-130j-1.6561280
[118] *Ibid.*

Western Europe] reinforces the logic and the increasing of the acquisition of multiple tankers, because clearly, there's some fairly pressing demand for airlift."[119] Airlift is required on the full spectrum of operations and there is definitely a place for the RCAF to take on the world stage and the global world order is shaken by rogue states.

Canada has not met the required 2% of GDP investment in National Defence. [120] The aviation industry produces off-the-shelf solutions that would be ideal for the RCAF and our commitment to our NATO allies. Operations are evolving rapidly. Speed and reach are required. The requirement for strategic and tactical airlift will not decrease. Increasing Canada's presence on the international scene through an imposing air mobility capability and gaining the reputation of being a dependable ally for various airlifts would result in a massive gains of air credibility, international political bargaining power and a focused professional air force.

RCAF Niche Capability 1 – Transport

This study recommends that one of the niche capabilities in which the RCAF should redirect its energy, focus, budget, and personnel is toward the transport fleet. The recommendation is to increase the number of assets and crews (in both flying and non-flying positions). More specifically, the recommendation is to acquire additional Boeing C-17 Globemaster III and to grow the current fleet of Lockheed C-130J Super Hercules. SSE is clear on the order of importance of where the CAF should focus, and the home front is the most important: *strong at home*.[121] From a political point of view, a domestic operation is a no-fail task and as Gray mentions, "the worst situation for a country is when it is either tempted into error or genuinely is obliged to pour so many scare resources into its secondary geostrategic environment that it fails in its primary one."[122] The government of Canada must carefully balance the RCAF's engagement abroad (third point of SSE: engaged in the world[123]) with the requirements for domestic air power. A certain level of risk is accepted at the political level every time an aircraft leaves the Canadian airspace for an international deployment; this is a zero-sum game. The more assets are flying away, the higher the risk. The political sphere and the very senior CAF leadership must also balance the request of air power from our allies.

Conclusion

This chapter demonstrates that the RCAF embodies the jointness of the CAF, and that air transport is a key indicator of this reality. Required to project forces both at home and abroad, the airlift is a role from one of the core capabilities of the RCAF that enable the six RCAF

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[119] *Ibid.*

[120] Government of Canada, "Defence Spending (including contribution to NATO)", last accessed 10 January 23, https://www.canada.ca/en/department-national-defence/corporate/reports-publications/proactive-disclosure/afgh-9-may-2022/nato.html
As published by the Government of Canada, in fiscal year 2021-22, Canada is forecasted to spend 1.36% of its GDP on defence and is forecasted to spend 1.43% by fiscal year 2024-25

[121] Canada. Department of National Defence. Strong, Secure, Engaged: Canada's Defence Policy. Ottawa: DND Canada, 2017.

[122] Colin S. Gray, *Airpower for Strategic Effect* (Air Force Research Institute (U.S.), and Air University (U.S.). Maxwell Air Force Base, Ala: Air University Press, Air Force Research Institute, 2012), p.62

[123] Canada. Department of National Defence. Strong, Secure, Engaged: Canada's Defence Policy. Ottawa: DND Canada, 2017.

functions.[124] The vastness of the Canadian territory increase the level of complexity of deploying troops in the homeland. Operating in and over the Arctic add a level of complexity to any operation that needs to be addresses by the RCAF to provide the level air power required for potential conflicts but also for humanitarian assistance operation in the northern regions. This chapter also demonstrated that COIN operations led to an increase in the demand for airlift from the land component to avoid unnecessary ground movements. The number of assets currently owned by the RCAF (air mobility division) was also presented as well as the distance between key geographical points that are used as hubs or area of operation. Those data were presented to illustrate the magnitude of effort required by the RCAF to enable operations in area of the world where the CAF have been most likely to deploy in the last two decades.

Finally, this chapter demonstrated that NATO as an organization is also in short supply of transport aircraft. This is not a RCAF centric problem. Resources (pool) sharing initiatives are underway in Europe. These programs are, however, inappropriate for the RCAF since the assets are in Europe and would consume too much flight time to reposition to Canada before deploying in a theatre of operation. Finally, this chapter recommends that the RCAF adopts *Transport* as a niche, that the Government approves additional spending to increase the current fleet of transport aircraft (and meet the 2% GDP spending on defence) and that the RCAF offers airlift (lines of tasking) to NATO countries (for approved NATO mission). The next chapter introduces the second potential niche for the RCAF: air-to-air refueling.

[124] Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016, 32.
The six functions are: command, sense, act shield, sustain, and generate

CHAPTER 3 – AIR-TO-AIR REFUELIN

Tankers are the lifeline for our command and for the Air Force.

Gen. Arthur J. Lichte, commander, *The Tanker Imperative*

Introduction

In 1949, a Boeing B-50 Superfortress named Lucky Lady II took off from Carswell Air Force Base (AFB) in Fort Worth, Texas.[125] It took the crew of thirteen aviators, commanded by Capt James Gallagher, ninety-four hours to complete the first non-stop flight around the world.[126] This achievement was of the utmost importance. As Smith mentions, "Lt. Gen Curtis E. LeMay, SAC [Strategic Air Command] commander, explained the significance of this flight for assembled members of the news media by saying that the Air Force could now deliver an atomic bomb to any place in the world that required one."[127] As tension was again on the rise on the world stage, this capability was crucial and represented a credible threat to any enemy of the United States. This success story could not have been done without the help of multiple tankers. Although they were paramount to the operation, the tanker crews received little public recognition while Gallagher and his crew were awarded the flying cross and were made celebrities.[128]

Smith paints an accurate but sad state of the affair when it comes to air-to-air refueling. As he regarded, "tankers do not generate the glamour, controversy, and speculative emotions-much less the inspirations to speech making and romantic nostalgia – that bombers and fighter planes do."[129] Although it was not the first ever air-to-air refueling ever, this first uninterrupted flight around the world had another dimension; the air force now had unlimited reach. [130]

While operating in Mali, France recognized early that one of its weaknesses from an air power's perspective was AAR.[131] Long-distance raids were unachievable without tankers. Unable to secure a long-term commitment from any allies, France had to rely on its own C-135 (which was initially in service in 1965). A slim 30% of all airborne refueling operations were conducted by allies from the United States, Spain, United Kingdom, and Germany.[132]

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[125] Richard K. Smith, *75 Years of Refueling History* (Washington: U.S. Government Printing Office, 1998) 29. Last accessed 17 December 2022, https://www.amc.af.mil/Portals/12/documents/AFD-141230-027.pdf
[126] *Ibid.,* 30
[127] *Ibid.*
[128] *Ibid.*
[129] *Ibid.*
[130] *Ibid.*
The first AAR , the first was conducted in 1923, at an altitude of about 500 feet above Rockwell Field on San Diego's North Island [between] two U.S. Army Air Service airplanes.
[131] Olivier Tramond and Philippe Seigneur. "Early Lessons from France's Operation Serval in Mali." Army 63, no. 6 (2013): 31.
[132] *Ibid.*

This chapter will introduce the concept of air-to-air refueling as another potential niche capability for the RCAF. To better understand how the RCAF enables fighter operations with air-to-air refueling, a review of the current doctrine is presented. This chapter also discusses the requirement for tankers during continental operations and the requirement of tankers for expeditionary operations with CENTCOM as an example. A look at how NATO utilizes tankers is presented and finally arguments are presented to illustrate the potential of air-to-air refueling as a niche capability for the RCAF.

The RCAF and AAR

According to the RCAF doctrine, impermanence is one of the key characteristics of air power. Impermanence means that "air platforms cannot remain aloft indefinitely and, therefore, cannot hold a station permanently."[133] The mitigating process for this challenge is either committing multiple assets in rotation with the end goal of "maintain[ing] a posture of relative permanence or by repeating missions as required."[134] Impermanence is also a factor affecting the degree of (de)centralization of control. An intriguing concept from the RCAF doctrine is the idea that aircraft "must return to base to refuel and reload, which argues for centralization of their control."[135] AAR mitigates impermanence by increasing the range and duration of missions. The RCAF doctrine on command and control almost completely brushes off the idea of airborne refueling, other than a quick mention regarding the role of AMD for the planning and coordination of such missions. In the capstone document, the doctrine acknowledges that "force projection is achieved by rapidly deploying high-readiness units using air-mobility assets and that the provision of AAR further enables capabilities by extending the flight range and loiter time of receiver aircraft […]."[136] The doctrine also recognizes that air attack requires the support of multiple enablers including AAR. Finally, the doctrine mentions that "AAR is thus a force enabler, a force multiplier, or both, depending on the mission to be conducted."[137] This final statement is critical and deserves more attention. If the RCAF acknowledges that AAR is critical to offensive operations, to transoceanic crossing and even to long-distance flights between the RCAF two main fighter bases (Canadian Forces Base (CFB) Bagotville and Cold Lake), then it would be expected that the RCAF operates and maintains an adequate level of assets and crew to conduct AAR operations.

In the recent years, Canada has committed one of the C150T to Operation Impact.[138] This deployment came at a price where domestic operations were in jeopardy. As LCol Lamarche states, "without AAR, fighters based in Cold Lake cannot intercept incoming bombers, clearly demonstrating the range limitation associated without refueling." [139] The lack of tankers hinders the RCAF's NORAD role hence posing a threat to national security while relying on U.S.

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[133] Department of National Defence, B-GA-402-001/FP-001, *Royal Canadian Air Force Doctrine Command and Control* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2018), 1.
[134] *Ibid.*
[135] *Ibid*., 15.
[136] Department of National Defence, B-GA-400-001/FP-001, *Royal Canadian Air Force Doctrine (*Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016), 24.
[137] *Ibid*., 35.
[138] Government of Canada, "Op Impact," last accessed 27 March 2023, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-impact.html
[139] J.S.G Lamarche, "The Backbone of Reach and Power: Air-to-Air Refueling in the RCAF" (Joint Command and Staff Program Course Paper, Canadian Forces College Paper, 2015), 50.

support for continental operations. The limited availability of RCAF tanker is a serious issue. The CC-150T and CC-130T play critical and distinct roles in RCAF operations and are key enablers of all RCAF fighters activities.[140] Without tankers, there is no domestic or expeditionary fighter activities."[141] Then Maj Pentney accurately depicts the reality of a fighter force operating on a long-range mission where "AAR is a matter of absolute necessity given that the CF-18 and any potential replacement lack the fuel capacity to be able to conduct oceanic crossings without AAR support."[142] Realistically, the fighter force requires AAR support for almost every mission set - especially in a defensive counter air (DCA), combat air patrol (CAP) or close air support (CAS).

Deployed Operations and Close Air Support

As Grant declares in *The Tanker Imperative*, "the work of today's tanker force amplifies the mission set seen in past air campaigns."[143] The USAF's current "crunch point comes in major operations across a theatre when air forces attack numerous targets and support ground forces."[144] Any intensive interdiction activity (IA) or CAS mission dramatically elevates receiver requirements. When land component elements are conducting operations in a non-permissive environment, they most of the time (almost always) require overwatch.[145] In 2017, the USAF had tankers returned to Afghanistan to increase the effectiveness of air support.[146] The purpose of the reshuffle of assets within CENTCOM was to get fuel to aircraft faster and to have more fuel available.[147]

A troop in contact (TIC) situation can take hours to resolve. For ground troops, the importance is to get air support. Fighter jets consume an enormous amount of fuel and need to consistently break away from the fight to refuel. Some pairs will sometime accept to break off to continue to support ground troops solo while the other rejoins the tanker, but it represents a high level of risk – especially while flying over hostile countries. Achieving missions while maintaining an acceptable level of risk requires delicate negotiations and a lot of cooperation between the CAOC, the joint terminal attack controllers (JTAC) and the air support operation centre (ASOC).[148]

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[140] A, Pentney, "Air-To-Air Refueling: A Capability Worth Modernizing" (Joint Command and Staff Program Course Paper, Canadian Forces College Paper, 2018), 1.
[141] *Ibid.*
[142] *Ibid.,*6.
[143] Rebecca Grant, *The Tanker Imperative* (Portland MA: Mitchell Institute Press, 2009), 20.
[144] *Ibid*., 23.
[145] Author's personal experience at CENTCOM.
[146] Brian Everstine, "Tankers return to Afghanistan," Air & Space Forces Magazine (Sep 2017). https://www.airandspaceforces.com/tankers-return-to-afghanistan/
[147] *Ibid.*
[148] United States Joint Publication 3-30, Joint Air Operations, II-9
Properly trained and qualified personnel are an important element in the CAOC weapon system. The ASOC is the main control agency of the TACS for execution of air operations in direct support of land operations. Its primary mission is to control air operations short of the fire support coordination line (FSCL) or in its assigned area. Normally collocated with the senior Army fires element, the ASOC coordinates and directs air support for land forces. The ASOC is directly subordinate to the AOC and is responsible for the coordination and control of air component missions in its assigned area. The tactical air control party (TACP) is an air liaison unit collocated with ground manoeuvre units. TACPs are subordinate to the ASOC and have two primary missions: advise ground

Firefights are not aligned with the air tasking orders (ATO), which means support to ground troops might begin with a pair of assets that will be replaced halfway through the engagement. The air assets flying over the sky of the CENTCOM AO come from all over the Middle East, including assets from the U.S. Navy afloat in the Mediterranean Sea. Air operations conducted from aircraft carriers are very particular due to their complexity in nature and the precision required for the deck cycle to allow for the launch and recovery operations.[149] As Grant points out, "operational trends over the last 40 years have shown that airpower today depends completely on tankers. Without a reliable fleet of them, the Air Force's expeditionary operations would be curtailed."[150] As demonstrated above, tankers are required to conduct air-to-air and air-to-ground missions. Operation Inherent Resolve (OIR) and Operation Enduring Freedom (OEF) were led by the United States and the USAF was able to provide most of the AAR assets.[151] In a different operating environment where the USA would be less involved, there would still be a need for tankers and the next section explore how NATO employs AAR.

NATO and AAR

Unlike for AWACS, NATO does not its own AAR assets. To this day, "NATO policy holds individual nations ultimately responsible for the training, maintenance, and deployment of their forces to and from an Area of Operations, including AAR."[152] The NATO doctrine regarding the employment of tankers is very much alike the USAF and the RCAF's philosophy where AAR is used to increase the flexibility of air power by "enhance[ing] combat effectiveness by extending the range, payload and endurance of receiver aircraft."[153] Deemed High Valuable Airborne Assets (HVAA), air superiority must be achieved before tankers can operate freely which adds to the level of complexity for air planners in the early stage of a campaign.[154] Op Unified Protector was the struggle required for Europeans countries to address the issue of AAR. As Gladman mentions in *The Future of Allied Airpower*, "it was agreed at the 2012 NATO Summit that the European Defence Agency (EDA) would lead efforts to address the shortfall of air-to-air refuelling (AAR) capacity and reduce the reliance on US capabilities."[155] To this day, the challenges persist.

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commanders on the capabilities and limitations of air operations and provide the joint terminal attack controllers that perform primary control of CAS attack aircraft. A forward air controller (airborne) is an extension of the TACP and is a specially trained and qualified aviation officer who exercises control of CAS aircraft while airborne.

[149] Author's personal experience in CENTCOM AOR. Assets from the U.S. Navy cannot be extended on station for only a few minutes over Iraq or Syria – they must stay multiple hours for their carrier to reshuffle the schedule and include them in the next recovery window. For the CAOC, amongst a multitude of planning actors, it means ensuring additional fuel is available. The ripple effect of a pair of assets on station for a few minutes is significant. It implies supporting two fighter jets for three hours (deck cycle) and without tankers, it would simply be impossible.

[150] Rebecca Grant, *The Tanker Imperative* (Portland MA: Mitchell Institute Press, 2009), 26.

[151] Author's personal experience in CENTCOM. For operational reasons, the complete list of current and past assets operating in CENTCOM is not published on open source.

[152] Joint Air Power Competence Centre, "Air-to-Air Refuelling Flight Plan, An Assessment," last accessed 11 February 2023, https://www.japcc.org/wp-content/uploads/JAPCC_AAR_Flight_Plan_web.pdf

[153] *Ibid.*

[154] *Ibid.*

[155] Brad Gladman, "The future of allied air power: The North Atlantic Treaty Organization," DRDC Scientific Report DRDC-RDDC-2014-R82. Trenton: Canadian Forces Aerospace Warfare Centre and DRDC Centre for Operational Research Analysis, October 2014, 43.

Part of the challenge for NATO is that its contributing air forces focus more on kinetic aircraft than "support" ones. As Swiss air power academic Christian Anrig has put it, "there is too much emphasis on the tip of the spear than the shaft."[156] Officially recognized by NATO, the "AAR requirement has not been matched by a corresponding purchase of tanker aircraft [and in] 2002, the overall shortfall of AAR was recognized by NATO in the Prague Capability Requirements (PCR), and by the European Union (EU) in the European Capabilities Action Plan (ECAP)."[157] In order to fix the shortfall in tankers, NATO has explored a few options to fill the gap. The options are 1- collectively owned fleet, 2 - an aircraft leasing program, and finally, 3 -a commercial AAR refueling interim solution (CAARIS).[158] The NATO planners are not able at this time to identify a definitive number of tankers required for future operations but are arguing that "the new fighters will be more efficient in fuel consumption, although [they] anticipate utilizing them on longer range and endurance missions requiring more fuel, and therefore potentially requiring more AAR support." [159]

The NATO doctrine on AAR is outdated and "the NATO AAR employment concept is as yet unapproved." [160] With the recent conflict in Ukraine, the shortfall of tankers coupled with the lack of doctrine is worrying. As stated in official NATO documents, "AAR has been, and will be, a critical enabling capability for joint air power employment and deployment."[161] As it stands, it is still up to individual nations to step up and to volunteer to fill those gaps. As a nation operating AAR receivers and tankers (with future tankers capability), this is a niche capability worth pursuing. The RCAF stepped up during Op Impact and was able to contribute with one tanker.[162] The CAF will indubitably continue to engage in contribution warfare. Kainikara mentions that "small air forces have to be geared for operation within a coalition."[163] To achieve the maximum effect, the RCAF contribution should be different than others - such as AAR. The experience acquired by aircrews on deployed operations would also be transferable for domestic operations since NORAD is also dependent on AAR.

AAR and NORAD

Canada's expansive land mass, particularly in the Arctic where useable airfields are scarce, makes an AAR capability critical for the RCAF CF-18s to be effective in their NORAD role. AAR is the one enabler that covers the full spectrum of RCAF's future responses. The quick reaction aircrafts (QRA) are located at CFB Bagotville and CFB Cold Lake. The distance between the air defence identification zone (ADIZ) and the point of origin of the QRA is hundreds if not thousands of miles depending on where the target is. Fighters do not have the

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[156] Christian F. Anrig, *The Quest for Relevant Air Power* (Maxwell Air Force Base: Air University Press, 2011), 204.

[157] *Ibid.*

Under the Prague Capabilities Commitment, member countries agreed to improve capabilities in more than 400 specific areas, covering eight fields essential to today's military operations.

[158] *Ibid.*

[159] *Ibid.*

[160] *Ibid.*

[161] *Ibid.*

[162] Government of Canada, *Operation Impact*, last accessed 27 March 23, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-impact.html

[163] Sanu Kainikara, Future Employment of Small Air Forces (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 21.

required fuel to take off, conduct an intercept and to return safely at the home base. For this reason, AAR is essential to conduct NORAD operations. As Goette mentions, "AAR's enabling of reach is essential in a country as geographically large as Canada."[164]

RCAF Niche 2 - AAR

There is no doubt that AAR is a force multiplier. The Government of Canada should invest in AAR capability, grow the current fleet, and pursue new technologies as they become available. LCol Lamarche clearly demonstrates the "decisive role that [AAR] plays in RCAF operations; it is a 'growth industry' and for the RCAF to stay relevant in its ability to command the air, the time has come to reinvest in [AAR]."[165] AAR assets increase the range and endurance of any mission based on AAR capable aircraft but also improve the flexibility of the RCAF to dynamically re-task airborne assets.

For the same reason that what was previously mentioned in the transport section (non-kinetic effects are preferred), performing AAR operations enable fighter aircraft to conduct kinetic operations while RCAF assets do not officially have the role of taking lives. Although it is debatable if one is morally more acceptable than the other, it appears that a support role in an air campaign would be easier to sell from a political point of view. Following the CF-18s withdrawal of Op Impact, the Liberal government opted to leave the tanker in place. In a CBC News article, former National Defence Minister Sajjan confessed that the coalition had mixed feeling about Canada withdrawing its strike assets.[166] The Canadian tanker remained in the theatre until 2019. The decision to remove the tanker was based on the tactical situation since fewer strikes were conducted.[167] With an average of 24 AAR missions per day in 2018 (one third less than the year before), it is easy to understand the importance of those assets. The lack of tanker availability is not limited to NATO, NORAD or the RCAF and other countries have quickly learned that AAR is essential to conduct an appropriate air campaign.

Tankers increase the range and endurance and improve flexibility, but they also reduce the vulnerability of assets by limiting the number of takeoff and landing in austere environment. Tankers also enhanced mission capabilities by providing aircraft with the option of carrying heavier payloads. During the evacuation of Kabul in the summer of 2021, the USAF was able to airlift more passengers than other any other nations per flight because they were able to refuel their C-17 airborne.[168] The utility of tankers is not limited to kinetic operations and have their use in the full spectrum of operations. As mentioned in "The Tanker Imperative," "the idea of a "smart" tanker got its start in the late 1990s with a secret program known as Warrior Gateway [where] "tankers would be modified to act as communications gateways and network managers

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[164] Richard Goette, "Preparing the RCAF for the future: defining potential niches for expeditionary operations," (Trenton: Royal Canadian Air Force Aerospace Warfare Centre, 2020), 40.
[165] J.S.G Lamarche, "The Backbone of Reach and Power: Air-to-Air Refueling in the RCAF" (Joint Command and Staff Program Course Paper, Canadian Forces College Paper, 2015), 96.
[166] "Conservatives accuse Harjit Sajjan of lying about allies' reaction to CF-18 withdrawal", *CBC News*, 4 April 2017, https://www.cbc.ca/news/politics/sajjan-cf-18s-iraq-1.4053485
[167] "Canada pulling refuelling plane from anti-Islamic State mission", CTV News, 25 January 2019, https://www.ctvnews.ca/canada/canada-pulling-refuelling-plane-from-anti-islamic-state-mission-1.4268912?cache=yes
[168] Author's personal experience.

in their part of the battle."[169] First equipped with Link-16 and then with a suite of satellite enabled communication, tankers became an integral part of the digital battlefield by contributing to the common operating picture (COP).

Official NATO documents clearly states that, "it is difficult to forecast the exact number of future tankers. However, current projections indicate fewer tankers, with increased individual capability."[170] Tankers remain a national asset under national command and control.[171] It is a perfect niche for the RCAF. A specific recommendation that Alan Stephenson has put forward is that "Canada should maintain the capability to deploy and sustain six multi-role fighter aircraft with air-to-air refueling to support NATO- or UN-sanctioned operations in addition to defence of Canada's commitments."[172] The status of the AAR fleet allows for domestic operations but is severely affected when overseas operations are ongoing.

Recently released by the RCAF Comd, the new RCAF strategy clearly states that "the RCAF's capabilities must rapidly evolve to ensure an operational advantage in the air and space domains."[173] The new strategy is honest and depicts the RCAF as it truly is: "many existing capabilities are inadequate, rudimentary and in need of modernization."[174] One of the approved and funded RCAF modernization program is the procurement of the Strategic Tanker Transport Capability (STTC). The replacement of the CC-150 Polaris aircraft is estimated to reach FOC by 2031 with six new STTC.[175] The procurement of those aircraft is a step in the right direction. Ultimately, it is important to mention that the requirement for air-to-air refueling was identified and appropriated funding was allocated. Major procurement projects are complex, lengthy, and subject to political influence. Although it is still too early to claim victory, this project seems to be on the right track.

Conclusion

This chapter reviewed the current RCAF doctrine on AAR operations. Imperative to continental and expeditionary operations, AAR is still very limited due to the number of assets currently owned by the RCAF and that the only receiver (currently owned) is the CF-18. This chapter also demonstrated how tankers can enable operations both at home in a NORAD role or abroad. This chapter explained how NATO holds individual nations responsible for their tankers requirement and the argument was made that the RCAF could adopt air to AAR as a niche

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[169] Rebecca Grant, *The Tanker Imperative* (Portland MA: Mitchell Institute Press, 2009), 21.
[170] Joint Air Power Competence Centre, "Air-to-Air Refueling Flight Plan, An Assessment," last accessed 11 February 2023, https://www.japcc.org/wp-content/uploads/JAPCC_AAR_Flight_Plan_web.pdf
[171] During war time, crises or any other emergency, a transfer of authority following the NATO process could be requested but would still fly under national caveats.
[172] Alan Stephenson. "The RCAF and the Role of Airpower: Considering Canada's Future Contributions", *Canadian Global Affairs Institute* (2016),
[173] Department of National Defense, *Royal Canadian Air Force Strategy*, last accessed 13 March 2023, https://www.canada.ca/content/dam/rcaf-arc/documents/reports-publications/royal-canadian-air-force-strategy.pdf
[174] *Ibid.*
[175] Government of Canada, *Strategic Tanker Transport Capability project,* last accessed 7 May 2023, *https://www.canada.ca/en/department-national-defence/services/procurement/strategic-tanker-transport-capability-project.html*

capability and therefore provide the much-needed assistance to other NATO countries and to increase its efficiency within its NORAD mandate.

Scarce resources are not only a Canadian problem. Many European nations that are like-minded have opted for the pooling of resources. Considering the distance between Canada and Europe, it would be difficult to join that pool of resources unless the RCAF establishes a permanent detachment of tankers in Europe. With the recent war in Ukraine and the tension rising in the Indo-Pacific region, creating a permanent detachment or wing in Europe would reinforce Canada's commitment to NATO and the contribution would be welcomed by allied partners. The wing could host transport aircraft, AAR assets as well as C2 platforms; the third proposed niche for the RCAF.

CHAPTER 4 – COMMAND & CONTROL OF THE AIR

> *Our AWACS can detect aircraft hundreds of kilometres away, making them a key capability for NATO's deterrence and defence posture.*
>
> - Oana Lungescu, *NATO deploys AWACS surveillance jets to Romania.*

Introduction

In 1973, Egypt and Syria launched the Yom Kippur War against Israel. The permission to launch pre-emptive strikes was denied to the Israeli Air Force (IAF). During the first day of the war, the IAF had the task to block the Egyptians and Syrians forces that had crossed the frontline. No enemy aircraft were able to penetrate Israel's airspace, but the IAF suffered intense casualties.[176] During the conflict, "Marines understood the importance of linking with Navy E-2C […], or linking with the larger, more capable United States Air Force E-3A Airborne Warning and Control System (AWACS) to detect low-level attacking aircraft."[177]

Following the end of the war, the United States Air Force conducted a review of areas identified as most impactful to its future success.[178] Incorporating lessons learned and analyzing results, "the focus on command-and-control platforms such as [AWACS] became a priority to the Air Force."[179] Lessons learned from 1973 were used during the first Gulf War. Although only 5 percent of all bombs dropped by the coalition were laser guided (LGB), they struck key targets and minimize the exposure of pilots to enemy fire, therefore diminishing the risk associated with the mission.[180] As mentioned by historian Joseph Doyle:

> The Air Force contribution to air-to-air combat was no less spectacular: the E-3 AWACS, of which the Air Force provided eleven, enabled beyond visual range (BVR) engagements that accounted for more than 40 percent of the Coalition's air-to-air kills, the first time in history that such a high percentage of kills had been achieved in BVR engagements.[181]

The relevance of the AWACS program was confirmed. The lessons learned from the Yom Kippur War were on point and the USAF was right in their assessment of the future conflict requiring a solid C2 network.

This chapter introduces the importance of commanding and controlling air operations. One way to accomplish this task is with an airborne early warning and control (AWACS) aircraft. As the air domain became more and more complex, more coordination became

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[176] Gordon, Shmuel L. "The Air Force and the Yom Kippur War: New Lessons." Israel Affairs 6, no. 1 (1999): 231, https://www-tandfonline-com.cfc.idm.oclc.org/doi/epdf/10.1080/13537129908719553?needAccess=true&role=button

[177] Robert W. Tomlinson, *The Influence of Foreign Wars on U.S. Domestic Military Policy: The Case of the Yom Kippur War*(Lexington Books, 2022), 78.

[178] *Ibid.* 49.

[179] *Ibid.*

[180] Joseph S. Doyle, *The Yom Kippur War and the Shaping of the United States Air Force* (Maxwell Air Force Base: Air University Press, 2019), 54.

[181] *Ibid.*

necessary to deconflict friendlies and assign the right task to the right asset. AWACS plays a major role in the delivery of air power by enabling and multiplying the effects of all individual assets. This chapter describes how airborne C2 is achieved for continental operations and explains how NATO AWACS are employed. Although the RCAF does not currently own AWACS, RCAF aviators are involved in the NATO AWACS program and arguments are made to demonstrate that the RCAF should adopt airborne C2 as a niche capability.

RCAF Doctrine

RCAF doctrine assures that centralized control and decentralized execution is the fundamental tenet of air power as it relates to C2.[182] The Canadian doctrine is also clear on the fact that air forces need to be organized to be effective. At the tactical and operational level, "centralized control also allows action to be refocused quickly to exploit fleeting opportunities, to respond to the changing demands of the operational situation, and to be concentrated at the critical place and time to achieve decisive results."[183] To achieve this level of control, multiple agencies must work together[184]. A significant key player to enable air operations is the AWACS whose primary role is to exercise C2. Kainikara mentions that "small air forces will have to seriously consider the importance of [AWACS] assets and assess the feasibility of their obtaining this capability within the constraints on the larger national security strategy."[185] The RAAF is an example of a success story with the development of the Boeing 737 AEW&C E-7 Wedgetail.[186]

Air C2

Discussions on airspace battle management (ABM) capabilities are often neglected. A small portion of the RCAF is directly employed to enable this capacity and the fighter force is (almost) exclusively their client. Fighter operations require a lot of support and work hand in hand with the air weapons controllers. The domestic mandate of the fighter squadrons in Canada is to provide assets to NORAD. This task cannot be accomplished by the fighter force alone; they require a C2 structure that is often forgotten. Whether it is because they work in remote locations, by default or design, or because their day-to-day job is not well understood, ABMs play a central role that often goes unnoticed.[187]

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[182] Department of National Defence, B-GA-400-001/FP-001, *Royal Canadian Air Force Doctrine (*Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016), 16.
[183] *Ibid, 21.*
[184] From the planners at the CAOC to the join terminal attack controllers (JTAC) forward deployed. This is later explained in detail.
[185] Sanu Kainikara, *Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 29.
[186] Royal Australian Air Force, "E-7A Wedgetail," last accessed 23 April 23, https://www.airforce.gov.au/aircraft/e-7a-wedgetail
[187] Government of Canada, "Aerospace Control Officer", last accessed 02 May 2023, https://forces.ca/en/career/aerospace-control-officer/
The literature explored for the writing of this DRP did not yield any relevant information on what the AEC community can bring to the RCAF. Sometimes, what is missing from the literature is as important as what is widely published. AEC are still operating in the shadow, similar to what the tanker crews did during the *Lady II* first flight around the world. The senior leadership positions offered to pilots and ACSO exceeds by far what is available to AEC creating a second class of RCAF officer. Author's personal experience also confirm the statement.

As mentioned in Canada's defence policy, secured at home mainly revolves around the partnership of Canada and the U.S. within the NORAD organization.[188] Operation NOBLE EAGLE, and its American counterpart Operation NOBLE DEFENDER, "provide the response to asymmetric air security threats occurring within North America, such as civilian aircraft being used as a weapon."[189] The command and control of the assets assigned to NORAD are co-located with the fighter squadrons at 3 Wing (12 Radar Squadron), 4 Wing (42 Radar Squadron). The Canadian Air Defence Sector (CADS), located in North Bay at 22 Wing, "is responsible for providing surveillance, identification, control and warning for the aerospace defence of Canada and North America at the Sector Air Operations Centre."[190] Intercept, air-to-air, training, and other missions are controlled from one of those key locations. Without ABMs, it would be impossible to conduct missions within the NORAD realm.

The current battlefield is complex and integrates all domains. The management of the battle on the ground is very much imbricated with the air domain. To *manage* the battle, a control agency must be present. 12 RS and 42 RS have some mobility capacity.[191] Although officially tasked to control air missions domestically, it is also part of both radar squadrons' mandate to "ensure the tactical control and/or surveillance of air operations from any location on the globe as assigned by 1 Canadian Air Division/NORAD Canadian Region."[192] Recently, 12 RS deployed to Belize in support of Operation CARIBBE, a "U.S.-led enhanced counter-narcotic operations in the Caribbean Sea and the eastern Pacific Ocean."[193] 12 RS was also deployed domestically deployed during the G7 summit in Quebec.

The USAF defines their ABM as "experts utilizing strategy, experience and an intimate knowledge of aircraft, weapons, and surveillance to control the outcome of an air battle."[194] Battlespace are not separated by elements anymore and future mission sets will be across all domains. Elements will all have to work together and incorporate the cyber and electronic warfare domains as well. As the battlespace becomes more complex, a solid air C2 structure must be in place. The graph below shows the complexity of the process.

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[188] Government of Canada. Department of National Defence. Strong, Secure, Engaged: Canada's Defence Policy. Ottawa: DND Canada, 2017. 14.

[189] Government of Canada, "Canadian Armed Forces Operations and Activities," last accessed 3 March 2023, https://www.canada.ca/en/department-national-defence/corporate/reports-publications/transition-materials/caf-operations-activities/2020/03/caf-ops-activities/norad.html

[190] Government of Canada, "Royal Canadian Air Force, 22 Wing North Bay", last accessed 25 March 2023, https://www.canada.ca/en/air-force/corporate/wings/22-wing.html

[191] Government of Canada, "Royal Canadian Air Force, 12 Radar Squadron", last accessed 14 February 2023, https://www.canada.ca/en/air-force/corporate/squadrons/12-radar-squadron.html
Both squadrons must be "ready to deploy on 72-hours notice and provide the required surveillance 24 hours a day, seven days a week, for 30 consecutive days once on the ground in the designated area of operations.

[192] *Ibid.*

[193] Government of Canada, "Current operations", last accessed 14 February 2023, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-caribbe.html

[194] United Air Forces," Air Battle Manager", last accessed 10 March 2023 https://www.airforce.com/careers/detail/air-battle-manager

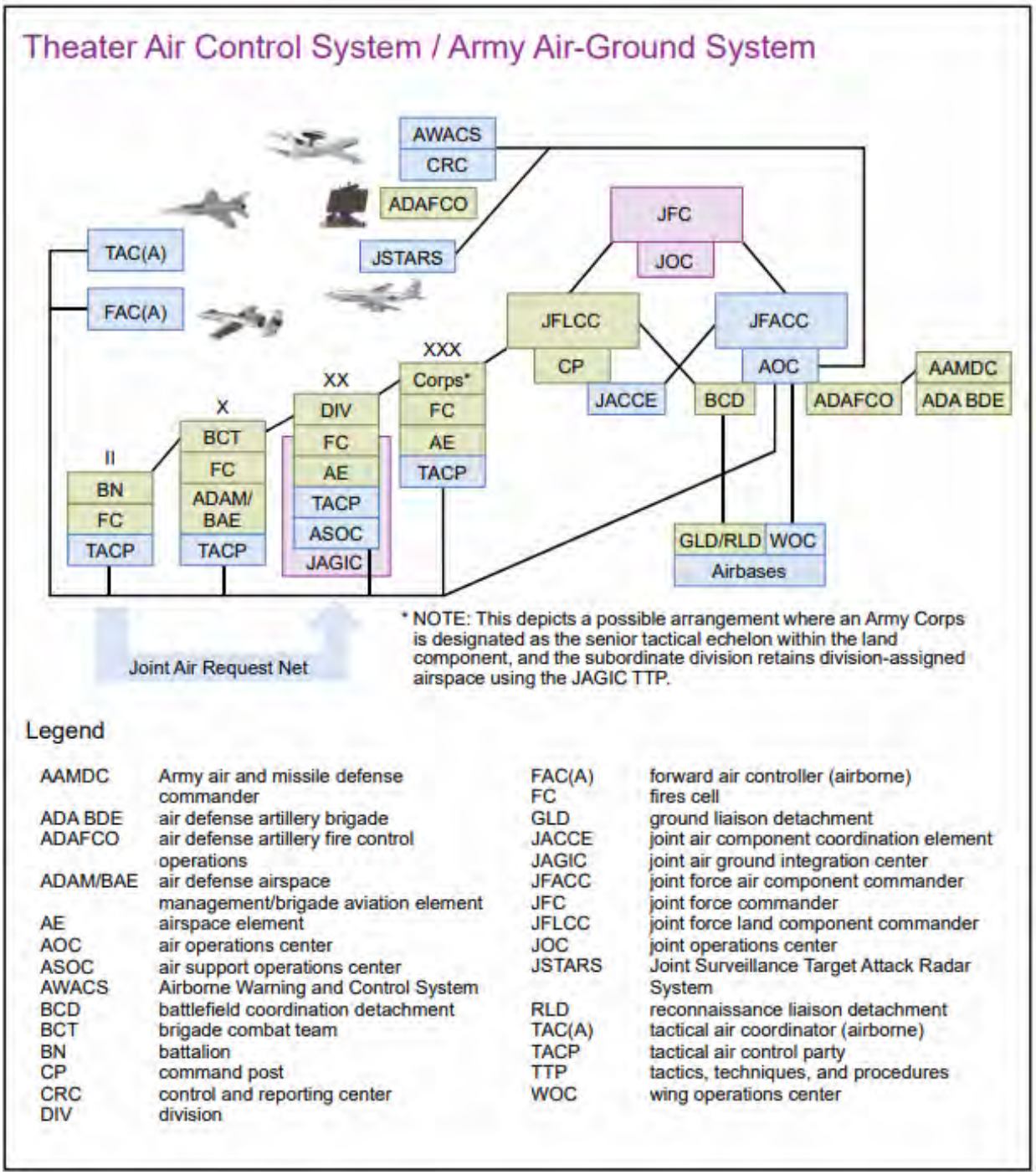

Figure 5.1 – Theatre Air Control System / Army Air-Ground System
Source: United States Joint Publications 3-30, *Joint Air Operations,* II-11.

NATO AWACS Program

Originally designed for strategic air surveillance and fighter control throughout Europe, the role of the NATO AWACS has evolved due to new threats and tension rising throughout the world. The NATO AWACS program "covers complex missions for the full spectrum of Air Battle Management, including air-to-air and air-to-ground control, air surveillance and airspace management, air policing, combat search and rescue, force marshalling and threat broadcast."[195] NATO Secretary stated that "NATO AWACS have been our eyes in the sky, supporting our operations for decades, from patrolling American skies after 9/11, to our operations in Afghanistan, and as part of the Global Coalition against ISIS."[196]

The aircraft and the crew have the capacity to enhance the situational awareness of all commanders by providing real-time updates obtained with the onboard radar. Since the deployment of a tactical control unit must be deliberate due to the extensive planning required for the physical move of the equipment and the personnel as well as all the contracts required for the real-life support (RLS), the AWACS provide a rapid solution that can intervene anywhere in the world at a very short notice. This is the flexibility that the RCAF require. As an airborne C2 platform, the AWACS allow military leaders to understand the tactical situation and to better coordinate their efforts. In situations where ground-based commanders might be on the move or focused on another priority, the AWACS crew can continue to allocate air power to the right targets and subordinate commanders can continue to provide direction and guidance from a remote location. As mentioned by Gladman, "each service contributes capabilities towards the overall aim of effective command and control. In austere locations, this contributes to efficiency, and in intensely contested environments, efficiency in the use of resources becomes an important way to ensure effectiveness."[197] As an early warning system, the AWACS is also equipped with technology that allows the crew to detect, identified and track various threats allowing friendly forces to act in consequence. The AWCS providing information on Russians troops and assets to the Ukrainians has been proven vital in the recent war.[198]

Communication is paramount to any military operation. Communication has evolved from runners in the First World War to the immensely complex communication network in the recent conflicts. The western world has been able to share information rapidly, accurately and encrypted. The first network-centric conflict was the Gulf War of 1990-91. During the first Gulf War, sixty satellites were used by the coalition and AWACS enabled communication.[199] The Iraqi communication systems were destroyed early in the campaign by advanced weapons which, ironically, required advanced communication systems.[200] AWACS can help while operating in a communication degraded environment as the aircraft are equipped with large communications

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[195] NATO, "Operations", last accessed 10 April 2023, https://awacs.nato.int/operations
[196] NATO, "Secretary General marks $1 billion contract to modernize NATO's fleet of AWACS aircraft," last accessed 14 February 2023, https://www.nato.int/cps/en/natohq/news_171307.htm
[197] Brad Gladman, "The future of allied air power: The North Atlantic Treaty Organization," DRDC Scientific Report DRDC-RDDC-2014-R82. Trenton: Canadian Forces Aerospace Warfare Centre and DRDC Centre for Operational Research Analysis, October 2014, 43.
[198] "NATO surveillance plane watches Russia's activity in Ukraine". *CBC news*, 19 Oct 2022, https://www.youtube.com/watch?v=mZYCLJDWckY
[199] Christopher H Sterling, *Military Communications: From Ancient Times to the 21st Century* (Santa Barbara: ABC-CLIO, 2007), xxxviii.
[200] *Ibid.*

suite allowing to broadcast information to other air assets, to relay information or to communicate with ground-based HQ from remote locations. Finally, it is important to note that although AWACS are generally used as an airborne C2 platform, they can also be used for peacetime operations such as Air Traffic Control (ATC), search and rescue, ISR and much more.[201]

RCAF Niche 3: C2 as a Niche Capability

AWACS can be utilized for peacetime and wartime operation. Air superiority cannot be achieved or maintain without a solid C2 structure. Like tankers, an AWACS is a force multiplier. Operating an AWACS is not a kinetic operation. From that point of view, it would be more appealing to policymakers to accept to deploy AWACS in a theatre of operation than to deploy fighter jets. In NATO AWACS: Alliance Keystone for out-of-area Operations, Dennis describes the deployment of an AWACS as "ostensibly benign and politically safe."[202] Kainikara describes air attacks as visually spectacular and for this reason are subject to more media attention.[203] More media attention can lead to bad poll results if the legality and/or legitimacy of the implication in a foreign conflict is debatable. Even when there is no debate that action should be taken, Kainikara mentions two obstacles to the deployment of air power in a kinetic role. This first one is the perceived lack of proportionality between what is interpreted as an infraction to the peace process and the response (air strike).[204] The second is the financial cost related to the deployment and conduct of offensive air operations.[205] As Kainikara mentions, "the balancing of political requirements and the need to optimize the application of air power will at times be dichotomous," and for this reason, adopting a niche capability model, niches that are more politically palatable, is the right path for the RCAF. C2 answers the criteria of the *political acceptance* test. All air campaigns require C2, and Canadian aviators are currently qualified and employed onboard NATO AWACS. By adopting C2 as a niche capability, the RCAF could offer a long-term support to NATO by ensuring a prolonged engagement in Europe and free up other nations willing to participate in operations that Canada is not willing to partake.

Conclusion

This chapter depicted how C2 is paramount to any air operation. Often misunderstood, the role of ABMs is generally unknown. The RCAF does not own AWACS but is part of the NATO AWACS program. An entire detachment of Canadian aviators based in Germany is consistently flying missions with those aircraft all over the world. The RCAF does have knowledge on how to operate those aircraft. Standing up of a new AWACS squadron in Canada would not be easy but it would certainly not be impossible. Finally, this chapter demonstrated

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[201] North Atlantic Treaty Organization," NATO Airborne Early Warning and Control," last accessed 26 April 23, https://ac.nato.int/missions/indicationsandwarnings/AWACS#:~:text=The%20AWACS%20is%20also%20capable,including%20Search%20and%20Rescue%20operations.

[202] Patrick Dennis, "NATO AWACS: Alliance Keystone for Out of Area Operations," Canadian Military Journal, 30.

[203] Sanu Kainikara, *Seven Perennial Challenges To Air Forces* (Canberra: Air Power Development Center, 2009), 47.

[204] *Ibid.,*50.

[205] *Ibid.*

that because of the versatility of this asset and the low political cost to accept the risk to deploy an AWACS overseas, the RCAF should pursue C2 as a niche capability.

Due to the nature of *what* can the AWACS provide, this asset has an importance beyond the battlespace. In the past, the sales of AWACS to certain countries have caused interference in the foreign relations.[206] Canada has the privilege of being a five-eyes member. The five-eyes community is a special group, and the *membership* must be truly considered as a privilege. Privileges do come at a certain cost. As a NATO country, Canada should also aim at spending 2 percent of its GDP on military budget. One way to increase the defence budget spending would be with the acquisition of additional air assets such as the AWACS. The RCAF is well positioned to own and operate AWACS. It would be in the nation's interest to invest in this capacity to increase the RCAF's NORAD effectiveness, conduct domestic and deployed operations.

The three potential niche for the RCAF presented in this paper – transport, AAR and C2- are not out of reach. The first step to achieve a niche capability air force is to socialize the concept which is the intent of this paper. The *what* and *why* were answered in the previous chapters. The next chapter will aim at proposing a path to get there; the *how.*

[206] Christopher H Sterling, *Military Communications: From Ancient Times to the 21st Century* (Santa Barbara: ABC-CLIO, 2007), xxxviii. In the early 1980s, the sale of AWACS aircraft by the United States to Saudi Arabia created a controversy with Israelis. The sale eventually went through, much to the benefit of the United States and its allies in the Gulf War a decade later. In 1982 Britain sought the loan of the AWACS to assist in its efforts to retake the Falkland Islands from Argentina. Concerned with its relationships in Latin America, the United States turned down that request. While the British won that conflict, AWACS capability might have prevented loss of a British warship to Argentine Exocet missiles. More recently, the United States opposed the Israelis' selling the AWACS to China because of its possible use against Taiwan. The Chinese obtained a Russian system and then replaced it with one of their own.

CHAPTER 5 - ROAD TO NICHE CAPABILITIES

Introduction

This chapter explores a few options to reduce the workload of the RCAF. The end goal is to refocus the RCAF efforts in certain niche capabilities. This is not a *do more with less* mentality. The options presented in this chapter reduce or eliminate activities in which the RCAF is engaged.

As mentioned in the study's Introduction and in the reconstitution chapters, the CAF are facing a staffing crisis at all levels. Former RCAF Commander LGen (Ret) Al Meinzigner mentioned to the *Maple Leaf*, the CAF's official newspaper, that "the loss of experience levels creates a cascading effect that cannot be solved simply by increasing our intake and our training capacity."[207] For the RCAF, the challenge is to retain experienced aviators. More recently, the current RCAF Commander mentioned that his challenge is to have enough people to take on the current operations and the new capabilities that are been added to the RCAF.[208] The shortage for aviators is a global problem and the private sector has been the choice for many RCAF personnel as it can offer a better pay and more stability.[209] Training new aviators will not fix the RCAF's experience gap. The RCAF cannot buy experience. The best that can be done is to retain current aviators. Immediate actions must be taken, and they must be bold. Some of the ideas presented below aim at reducing activities that are not in direct support of the RCAF mandates while others question the relevance of activities in which the RCAF is heavily involved.

Disband 431 Air Demonstration Squadron

Home of the aerobatic demonstration flight, 431 Sqn is located at 15 Wing Moose Jaw, Saskatchewan. They fly the CT114 Tutor and perform at various airshows in North America. According to their official website, "pilots, technicians […] mobile support operators, resource management support clerks, an engineering officer, a logistics officer and a public affairs officer representing all three elements, work as a team to bring thrilling performances to the Canadian public."[210] With an average of eighty members, this squadron does not contribute to domestic operations other than airshows. Although it is common for air forces to maintain a demonstration team, "Canada is the only country with a full-time team flying a nine-ship formation with an airframe that is not used for any other purpose."[211] The Tutor has not been used in training since

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[207] The Maple Leaf, "The race to retain and increase experience levels in the RCAF", last accessed 23 January 2023, https://www.canada.ca/en/department-national-defence/maple-leaf/rcaf/2019/07/the-race-to-retain-and-increase-experience-levels-in-the-rcaf.html

[208] "Aerospace Chief Conversation: RCAF Commander Lt Gen Kenny", *Mitchell Institute*, February 11, 2023, https://mitchellaerospacepower.org/episode-115-aerospace-chief-conversation-rcaf-commander-lt-gen-kenny/

[209] The Maple Leaf, "The race to retain and increase experience levels in the RCAF", last accessed 23 January 2023, https://www.canada.ca/en/department-national-defence/maple-leaf/rcaf/2019/07/the-race-to-retain-and-increase-experience-levels-in-the-rcaf.html

[210] Government of Canada, "Showcasing the Royal Canadian Air Force, Canadian Forces Snowbird" last accessed 03 February 2013, https://www.canada.ca/en/air-force/services/showcasing/snowbirds.html

[211] K. Wilton, "The RCAF Snowbirds: A Retirement Long Overdue" (Joint Command and Staff Course Paper, Canadian Forces College, 2022), 15.

2000.[212] The RCAF Snowbirds do not contribute to the defence of North America (secured in North America) and neither they are involved in the world other than airshows in the United States.[213] To sum it up, they do not contribute to the defence of Canada, nor they provide air power capable of being used for defence purposes.

Although arguments could be made that the Snowbirds can potentially inspire Canadians to join the RCAF and therefore act as a recruiting tool, no evidence can directly support this claim.[214] Matthew Rech, a Ph.D. candidate at Newcastle University, suggests that airshows generate general aviation awareness-raising and are only linked to indirect recruitment.[215] In his thesis, Rech also quotes a recruiter following the RAF at airshows and states that "You won't be getting people signing on the dotted line [at airshows], rather it's about awareness."[216] The gap between showing interest at an airshow and actually joining the RCAF is a long road. Various airshows across Canada have hosted the Blue Angels, F22s, F35s and other crowd favourites, and the recruiting argument could be made with any flying platform. Furthermore, airshows have been a joint endeavour in Canada. With every element present, it is generally easier for the crowd to interact with the CA or the RCN representatives than the Snowbirds pilots themselves - that spends most of their time preparing their flight or in VIPs tent.[217]

Another challenge for 431 Air Demonstration Squadron is the status of its aircraft. The CT-114 were first used by the Snowbirds in 1971.[218] They are aging assets and will require a replacement project for the Snowbirds to continue to fly past their end of life (who has already been extended by many years and a few times). In 2021, the replacement project for the CT-114 was estimated at $755M and a decade later the estimated was up to $1.5B.[219] The life of nine aviators has been claimed since the beginning of the RCAF Snowbirds program. None of these lost were attributed to combat. Within the last few years, multiple incidents were caused by aircraft malfunctions and many incidents were resolved by pilots not following the standard

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[212] *Ibid.,* 4.
[213] K. Wilton, "The RCAF Snowbirds: A Retirement Long Overdue" (Joint Command and Staff Course Paper, Canadian Forces College, 2022), 18.
[214] *Ibid.*, 15.
Government of Canada, "RCAF Air Demonstration teams launch 2021 season under Operation Inspiration", last accessed 07 May 2023, https://www.canada.ca/en/department-national-defence/news/2021/05/rcaf-air-demonstration-teams-launch-2021-season-under-operation-inspiration.html
Due to the COVID-19 pandemic, airshows were cancelled for the 2020 seasons and operation Inspiration was stood up. The purpose of this operation was to "inspire and build relationships with Canadians."
[215] Matthew F. Rech, "A critical geopolitics of RAF recruitment" (Ph.D. thesis, Newcastle University, 2012), 129.
[216] *Ibid.,*130.
[217] Author's personal experience of multiple airshows at various RCAF bases. The CA and the RCN usually have numerous ambassadors demonstrating their skills and equipment. The CA and RCN members usually spend most of their time engaging with the crowd while the RCAF is generally busy running the airshow at their own base. Following their show, pilots will usually congregate in VIP tents where they engage with local leaders rather than the crowd. Previous experiences have shown than static displays have been staffed by junior team members who had not reached their operational functioning point (OFP) and could poorly interact with the crowd.
[218] David Pugliese, "The Canadian Forces spending $755M to replace Snowbird jets." *The National Post*, 16 August 2012, https://nationalpost.com/news/canada/canadian-forces-spending-755m-to-replace-snowbird-jets
[219] *Ibid.*

operation procedures (SOP).[220] Many pilots based their actions and decisions on their experience and gut feeling, saving the life of a few of them.[221] Others were not so lucky.[222]

The RCAF is facing a staffing problem but more importantly lacks experienced aviators. The Snowbirds run their own selection program and hand pick the pilots that are the most suited for the job.[223] The pilots selected for the demonstration team are part of the critical category of aviators of which the RCAF is in short supply. A procurement project will be required very shortly to replace aging assets, which will require additional staff to manage.[224] Given the Snowbirds' recent struggles and the aging platforms, it is arguably just a matter of time before another accident happens.[225]

Financially like the last CF-18 last upgrade[226], the cost related to the replacement of the CT-114 is significant. Policymakers would therefore have to be convinced of the positive outcome before agreeing to spend this amount of public money. This massive federal expense would be very loosely in line with the current RCAF mission to "generate relevant, responsive and effective air and space power at home and abroad."[227] However, it would not be justifiable as it does not contribute to the RCAF's main mission as defined in SSE."[228] Furthermore, the dissolution of 431 Sqn would free up between 15 and 20 wing qualified pilots that could be

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[220] Murray Brewster, "Snowbirds aircraft crash following August air show due to oil filter, investigators find", CBC News, 05 October 2022, https://www.cbc.ca/news/canada/saskatoon/snowbirds-crash-oil-filter-investigation-report-1.6607249. According to the CT114 pilot's checklist C-12-114-000/MC-001, this type of emergency requires the pilot to eject. In this situation, the pilot abstained from ejecting possibly saving his life. Other information obtained by discussing with actual and former RCAF Snowbird pilots that requested their names to be kept secret.

[221] LGen A.D. Meinzinger, "Views on Flight Safety," *Flight Comments*, no. 1 (2018): 4. Then Commander of the Royal Canadian Air Force, LGen Meizinger explained that although SOPs are created to make flying operations safer, there will be times where operators will have to deviate from these procedures. He also mentioned that the RCAF leadership "relies heavily on its members to identify procedural shortfalls for revision and refinement".

[222] Julian Abraham, "Investigation confirms bird flew into Snowbirds plane engine in crash that killed Capt. Jenn Casey", CTV News, 29 March 2021, https://atlantic.ctvnews.ca/investigation-confirms-bird-flew-into-snowbirds-plane-engine-in-crash-that-killed-capt-jenn-casey-1.5366450
Capt Jenn Casey lost her life during Op Inspiration. This operation was a cross-country tour aimed at boosting Canadians' spirits during COVID-19. The investigation demonstrated that the old ejection seat of the CT-114 was inadequate in this situation leading to the loss of her life.

[223] K. Wilton, "The RCAF Snowbirds: A Retirement Long Overdue" (Joint Command and Staff Course Paper, Canadian Forces College, 2022), 18.

[224] Government of Canada, "Defence purchases and upgrades process", last accessed 01 May 2023, https://www.canada.ca/en/department-national-defence/services/procurement/defence-purchases-upgrades-process.html . The CAF procurement process is complex. Often defined as broken, the system has recently been able to deliver major procurement projects. To reach the end goal, multiple staffers must unite their effort and demonstrate that their project is a higher priority than competing project which often leads to projects that will not come to fruition despite the countless hours of staff work involved. Change in government, changes in priority or changes in the economic situation are only a few factors affecting the success or not of a procurement project.

[225] The exact number of Flight Safety Occurrence can be obtained via the FSIM program but is not releasable.

[226] Lee Berthiaume, "Federal government to spend hundreds of millions more to keep CF-18s fighting fit", CBC News, 14 January 2020, https://www.cbc.ca/news/politics/fighter-jets-millions-dollars-1.5426860

[227] Government of Canada, "Royal Canadian Air Force Strategy, last accessed 01 May 2023, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-strategy.html

[228] Government of Canada, "Strong, Secure, Engaged: Canada's Defence Policy", last accessed 01 May 2023, https://www.canada.ca/en/department-national-defence/corporate/reports-publications/canada-defence-policy.html
The Royal Canadian Air Force is an agile and integrated force whose reach and power is essential to Canadian Armed Forces operations at home and abroad.

either joining an operational fleet or contribute to the training establishment. The support team (aircraft technicians, logistic, public affair, etc.) could also be redirected toward units in dire need of personnel.

Review the RCAF Mandate for Search and Rescue (SAR)

With the current Reconstitution struggles, it is time to re-evaluate the RCAF's mandate for airborne SAR. Given the size of the country, SAR is a shared responsibility in Canada.[229] Traditionally, SAR responsibilities were given to the military forces at the end of the Second World War since they were the only governmental or civilian agency that operated aircraft and vessels capable of such missions.[230] As the years went by, the CAF developed expertise in SAR and acquired more modern equipment while also forming SAR technicians who are "highly trained specialists who provide advanced pre-hospital medical care and rescue for aviators, mariners and others in distress in remote or hard-to-reach areas."[231] The CAF has the primary responsibility of providing aeronautical SAR services (and ground-based SAR) and the Canadian Coast Guard is responsible for maritime SAR services."[232] The CAF is also responsible for the effective operation of this coordinated aeronautical and maritime SAR system.

Multiple fleets are currently devoted to SAR within the RCAF. They require numerous aviators from different trades to accomplish their mandate. Furthermore, considering that SAR is 24 hours a day posture, crews must work in alternate shifts to always ensure coverage.[233] When

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[229] Public Safety Canada, "National Search and Rescue Program", last accessed 01 May 2023, https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/rspndng-mrgnc-vnts/nss/prgrm-en.aspx. The National Search and Rescue Program (NSP) is a Canada-wide horizontal program that integrates organizations and resources involved in the provision of search and rescue (SAR) services to Canadians, including SAR response and prevention. The responsibility for the NSP resides within Public Safety and Emergency Preparedness Canada, through the National Search and Rescue Secretariat (NSS). The NSS' role is to serve as a central coordinator for the National SAR Program, working directly with federal, provincial/territorial as well as air, ground and marine volunteer SAR organizations involved in search and rescue activities. Within Canada, SAR activities span a multitude of jurisdictions:
The Canadian Armed Forces are responsible for aeronautical incidents;
The Canadian Coast Guard is responsible for marine incidents;
Parks Canada is responsible within national parks; and
Provincial and territorial governments are responsible for searches for missing persons including those who are lost or overdue on land or inland waters - commonly known as Ground Search and Rescue (GSAR), and often delegated to the police service of jurisdiction.
15,000 specially trained air, ground and marine SAR volunteers provide response assistance to the authorities and deliver prevention messaging to the Canadian public to help minimize the frequency and severity of SAR incidents. The Civil Air Search and Rescue Association (CASARA) assists the Royal Canadian Air Force for aeronautical SAR; the Canadian Coast Guard Auxiliary (CCGA) assists the Canadian Coast Guard in marine SAR; and the Search and Rescue Volunteer Association of Canada (SARVAC) assists police forces of jurisdictions for ground-based SAR.
[230] James Pierotti, "Charting a Different Course: Search and Rescue Origins in Canada," *RCAF Journal*, 6, 3 (Summer 2017): 57, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-journal/2017-vol6-iss3-summer.html
[231] Government of Canada, "About Search and Rescue", last accessed 26 April 2023, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/types/search-rescue/about.html
[232] Government of Canada, "About Search and Rescue", last accessed 20 April 2023, https://www.canada.ca/en/air-force/programs/search-rescue.html
[233] *Ibid.*

the SAR mandate was initially assigned to the RCAF, there was no other agency capable of accomplishing these types of missions.[234] Today, the private sector has made significant progress and can now compete with the RCAF. Air Medic, a private company operating in Quebec, "provides medical assistance and ground and air transportation anywhere in Quebec."[235] Since the foundation of the company in 2012, Air Medic conducted 6192 missions.[236]

Air Medic demonstrates that the private sector, in collaboration with law enforcement agency and local authorities could take over some SAR responsibilities from the RCAF. Enabling local volunteers could also be a venue to increase the effectiveness of SAR missions and to leverage the expertise of certain terrain that is only known to residents. In a DRP, LCol Darras reviewed the comprehensive study that was conducted by the Standing Senate Committee on Fisheries and Ocean and concluded that a public-private partnership for SAR delivery was an adequate solution.[237] The RCAF could probably not move away completely from a SAR role due to the SAR treaty and the perception of the Canadian population, but a review of the current mandate is necessary.[238] To progress, the RCAF must challenge the Status Quo.

Increase the Use of Remotely Piloted Aircraft (RPA) & Pilots

The new strategy revealed by the RCAF Comd in February 2023 includes the use of RPA in conjunction with the acquisition of MQ-9B.[239] The procurement of RPA began with the release of SSE in 2017 where it was clearly announced that Canada would acquire RPAs. In April of 2019, the project approval in the definition phase was received. DND expects that the

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The CH-149 Cormorant and CH-146 Griffon helicopters are the primary rotary-wing aircraft used to respond to SAR. They offer swift response times, powerful hover and hoist capabilities, and dedicated SAR personnel. The CC-130 Hercules offers dedicated SAR personnel and specialized equipment such as air-droppable survival kits, including life rafts and shelters. Most other CAF aircraft, such as the CP-140 Aurora, have a secondary SAR role.

[234] James Pierotti, "Charting a Different Course: Search and Rescue Origins in Canada," *RCAF Journal*, 6, 3 (Summer 2017): 56, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-journal/2017-vol6-iss3-summer.html

[235] Air Medic, "About Us", last accessed 26 April 2023, https://www.airmedic.net/about

[236] *Ibid.*

[237] L. Darras, "Expanding the search: an institutional analysis of a public-private partnership in Canadian search and rescue" (Joint Command and Staff Program Course Paper, Canadian Forces College, 2019), 23.

[238] Government of Canada, "Treaty E105240" last accessed 02 May 2023, https://www.treaty-accord.gc.ca/text-texte.aspx?id=105240

Canada is a signatory of the 1979 International Convention on Maritime Search and Rescue, hereinafter referred to as "the SAR Convention", and the 1944 Convention on International Civil Aviation, hereinafter referred to as "the Chicago Convention".

James Pierotti, "Charting a Different Course: Search and Rescue Origins in Canada," *RCAF Journal*, 6, 3 (Summer 2017): 57, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-journal/2017-vol6-iss3-summer.html. The expansion of the SAR system to include maritime rescue required much less time and discussion. The expansion started with the United Nations–sponsored International Convention for the Safety of Life at Sea held in London, June 1948, to improve the safety of marine transportation. The convention's agreement added Regulation 15, which required contracting governments "to ensure that any necessary arrangements [were] made for coast watching and for the rescue of persons in distress at sea round its coasts."61 Maritime rescue, like aviation rescue, was now internationally mandated.

[239] Government of Canada, "Royal Canadian Air Force Strategy", last accessed 12 mars 2023, https://www.canada.ca/en/air-force/corporate/reports-publications/royal-canadian-air-force-strategy.html

contract will be awarded during the fiscal year (FY) 2023 or 2024 and that initial operational capability (IOC) reached between 2027 and 2031.[240]

During the war on terror, the Americans and their allies have extensively used RPAs to initially conduct ISR and eventually carry out precision strikes. Today, the U.S. military "justifies drone warfare on the basis of the precision it is able to achieve in targeting the enemy."[241] RPA technology quickly evolved during the last two decades. Autonomous drones operating with artificial intelligence (AI), AAR capable RPA and high-altitude satellite communication enabled RPA are now fully operational.[242] The characteristics of air power equally apply to RPA and enable operators and humans to remain away from danger. Bomber or fighter pilots striking a target in the Middle East are themselves at risk. The use of drones removes the pilot while the delivery method remains somewhat the same – with altitude – a key characteristic of air power.[243] Patrolling the Canadian North is a hazardous task, especially because the land is mainly uninhabited and there is very limited possibility to divert if the aircraft suffers catastrophic damage. One of the Special Operation Force truths is that "humans are more important that hardware."[244] There is no reason that this concept should not be extended to conventional forces. Leveraging RPAs for dangerous tasks should be the first course of action.

One of the advantages of using RPAs in a targeting and striking capacity is that the RPAs can stay on station for a long period of time. This not only addresses the air power characteristic (a weakness, in fact) of persistence, but it also allows ground personnel to rotate during the mission and to strike when the risk of collateral damage is at the lowest.[245] With the use of drone strikes, the "civilian casualties have fallen sharply."[246] RPAs have also reduced the casualties for the friendly forces since real-time intelligence can be shared with ground troops almost immediately helping the commander to adjust their battle procedure. RPAs are also useful to collect information. According to the government of Canada's website, "the iconic red planes of Canada's National Aerial Surveillance Program (NASP) are a pillar in helping Canada stay safe."[247] With a fleet of Dash 7&8, the crews patrol the Canadian skies to prevent pollution, protect whales and to serve Canadians by "supporting national security events, police investigations, search and rescue incidents, humanitarian efforts, and civil emergencies."[248] The

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[240] Government of Canada, "Remotely Piloted Aircraft System (RPAS)", last accessed 26 April 23, https://www.canada.ca/en/department-national-defence/services/procurement/remotely-piloted-aircraft-system.html last modify 2022-02-15.
[241] Rebecca Adelman and David Kieran, *Remote Warfare: New Cultures of Violence*, (Minneapolis: University of Minnesota Press, 2020), 44.
[242] Michael J. Boyle, "The Drone Age: how Drone Technology will Change War and Peace" (New York : Oxford University Press, 2020), 112, 256.
[243] Ismael Koussay, "Integration of Remotely Piloted Aircraft in Support of RCAF Missions" (Joint Command and Staff Program Course Paper, Canadian Forces College, 2022), 69.
[244] Joint Special Operations University, "SOF Truth", last accessed 23 January 23, https://www.jsou.edu/
[245] Department of National Defence, B-GA-400-000/FP-00, Royal Canadian Air Force Doctrine, (Trenton : Royal Canadian Air Force Warfare Center, 2016), 17.
[246] Avery Plaw, Carlos Colon and Matthew S. Fricker, *The Drone Debate: A Primer on the U.S. use of Unmanned Aircraft Outside of Conventional Theatres of War* (Lanham, MD: Rowman & Littlefield, 2015), 51.
[247] Government of Canada, "National Aerial Surveillance Program", last accessed 23 January 20, https://tc.canada.ca/en/programs/national-aerial-surveillance-program
[248] Ibid.

program recently acquired RPAs capable of long-range missions and will soon be used to patrol over the oceans according to the official webpage of the program. The RCAF should leverage the expertise of the NASP and implement a similar program that has capabilities that could be complementary to the NASP with a focus on military tasks only.[249]

In the recent decades, RPAs have not always been perceived in a positive way in the public's eye.[250] Between the leak of information from WikiLeaks and the Hollywood movies depicting drone pilots as cold-blooded killers remote from the war, the truth is somewhere in between. While the technology is available to have RPAs engaging targets automatically, it does not mean that this mode of operation is used. Humans have the difficult task to take those decisions and are instrumental to the kill chain. As stated in the *Drone Debate*, "the growing hostility generated by drone strikes has arguably fueled anti-Americanism."[251] To counter the bad press, Chapa suggests that organizations be transparent with regards to the use of RPA and that educating the population is required on what RPAs are, what they can achieve and how they operate.[252]

RPAs strikes are often perceived as perfidious and lack the chivalry too often romanticize in the common Hollywood culture. Recent conflicts in the Middle East and in Africa largely employed RPAs but they were used against an enemy that did not have the same technology. The recent war in Ukraine has showed what RPAs can do against a near-peer enemy.[253] It is evident that having a fleet of RPAs generates a tactical advantage. Although less maintenance intensive than manned aircraft, RPAs require a crew to operate them and use them at the full potential. Martha McSally, a retired U.S. Air Force colonel now in Congress, reported that "it takes over 200 operations and intelligence personnel to sustain a RPA like a Predator or a Reaper in an orbit for 24 hours."[254] This number takes into account all phases of the operation and it could be done by much less personnel. This is the worst-case scenario, and this is the upper limit on the scale of personnel required. The economy of effort lays also in the training required to operate RPAs. It takes much longer to train a pilot and aircraft technician that it takes to train a RPA operator and RPA technician.

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[249] Government of Canada, "Current Operations and Joint Military Exercises list," last accessed 7 May 2023, https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/list.html
DND must always operate within the boundaries of the law. Specific sets or regulations determine what the CAF is allowed to do in Canada. However, using RPAs to build the recognize maritime picture (RMP) in international water could be done with the use of RPAs.

[250] Joseph O. Chapa, "Remotely Piloted Aircraft and War in the Public Relations Domain," *Air & Space Power Journal* (September-October 2015): 32

[251] Avery Plaw, Carlos Colon, and Matthew S. Fricker, *The Drone Debate: A Primer on the U.S. use of Unmanned Aircraft Outside of Conventional Theatres of War* (Lanham, MD: Rowman & Littlefield, 2016), 81.

[252] Joseph O. Chapa, "Remotely Piloted Aircraft and War in the Public Relations Domain," *Air & Space Power Journal* (September-October 2015): 42.

[253] DJII RPAs and other civilian RPAs have been used to conduct ISR over the frontline. Easy to operate and maintain, those RPAs have been operated by civilians who also leveraged social media to then share the information quickly about the enemy's positions. RPAs for civilian usage have also been modified to carry lethal attack. Joe Tidy. "Ukraine rapidly expanding its 'Army of Drones' for front line". BBC News, 26 April 2023, https://www.bbc.com/news/technology-65389215

[254] Avery Plaw, Carlos Colon and Matthew S. Fricker, *The Drone Debate: A Primer on the U.S. use of Unmanned Aircraft Outside of Conventional Theatres of War* (Lanham, MD: Rowman & Littlefield, 2016), 25.

The RCAF's approach to RPAs is somewhat contradictory with Canada's defence policy. SSE reads that the CAF "must also attract Canadians with the aptitudes and skill sets required to succeed in highly technical domains such as space and cyberspace and to operate and maintain increasingly sophisticated equipment, including remotely piloted systems."[255] As mentioned by the RCAF Comd, winged pilots will be operating RPAs since they will enter civilian airspace. While the priority of the CAF is reconstitution, it appears that the RCAF would be underutilizing its pilots by having them operate RPAs. The civilian sector does not require a commercial pilot license to operate a drone.[256]

While there is some rationale behind the decision of having winged pilots at the command of a RPA, the current staffing of flying squadrons indicates otherwise. Pilots are a scarce resource and should be employed in the cockpit. Jeremiah Gertler, a specialist in military aviation raised the question in a report for the U.S. Congress as to who should operate RPAs from civilians to military pilots.[257] There are other trades in the RCAF such as Air Combat System Officer (ACSO)[258] and Aerospace Controller Officers (AEC)[259] that both understand the rules and regulations from Transport Canada (TC) and understand air operations. Having a pilot removed from the flight line to operate a RPA should be avoided. Under Op Talent & Op Experience, the RCAF was exploring the possibility of creating Public Service instructor positions. The goal was to "free up RCAF pilots from instructor positions so that they can return to/remain in flying positions at the tactical units."[260] The creation of the Air Operations Officer (AOO) position was a step in the right direction to ensure that operators could focus on their primary duties at the tactical level while other responsibilities and wing functions were rerouted toward the AOO.[261]

RPAs also promise to aid in SSE's objectives of Canada being safe at home and secure in North America, notably the Arctic. As mentioned in a report from the Standing Committee on National Defence, "the Committee recommends that the Government of Canada considers the use of unmanned and unarmed aerial vehicles (UAVs) for the surveillance of Canadian Arctic territory."[262] Increasing the use of RPAs and having pilots in cockpits at the tactical level would be in line with the intended outcomes of the CDS when he approved the launch of Op Talent and Op Experience. This concept also supports the idea of adopting a niche capability model. RPAs have proven their value during combat missions in various parts of the world and technology will

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[255] Government of Canada, "Strong, Secured, Engaged, Canada's Defense Policy", last accessed 15 March 23, https://www.canada.ca/en/department-national-defence/corporate/policies-standards/canada-defence-policy.html
[256] Government of Canada, "Drone Safety", last accessed 24 April 2023, https://tc.canada.ca/en/aviation/drone-safety
[257] Unites States Congress, *U.S. Unmanned Aerial Systems*, (Washington, DC: The library of Congress, 03 January 2012), 30, https://apps.dtic.mil/sti/pdfs/ADA566235.pdf
[258] Government of Canada, "Air Combat Systems Officer", last accessed 02 May 2023, https://forces.ca/en/career/air-combat-systems-officer/
[259] Government of Canada, "Aerospace Control Officer", last accessed 02 May 2023, https://forces.ca/en/career/aerospace-control-officer/
[260] Government of Canada, "Operation TALENT: Quality of Life - Quality of Service" last accessed 24 March 2023, https://www.canada.ca/en/air-force/services/benefits-military/quality-life-quality-service.html
[261] Government of Canada," The RCAF Now Has Its First Air Operations Officers", last accessed 02 May 2023, https://www.canada.ca/en/air-force/corporate/reports-publications/rcaf-perspectives/the-rcaf-now-has-its-first-air-operations-officers.html
[262] Standing Committee on National Defense, "Canada and the Defense of North America", last accessed 26 April 2023, https://www.ourcommons.ca/DocumentViewer/en/41-2/NDDN/report-13/page-105#28

make them more affordable, easier to operate, and will allow for multiple mission sets with a single platform.[263] The Canadian North is vast and treacherous. With the Northwest Passage becoming more and more attractive to commercial shipping, it is paramount that the RCAF continues to protect the sovereignty of the Arctic, monitor pollution and ecological disaster, and monitor foreign actors with adverse end states.

Discussion on Niche Capabilities

Today's air power theory is based on lessons learned from the past. Colin Gray argues that "airpower theory is founded upon the empirical evidence of somewhat arguable historical experience, and its primary function is to assist those who must execute airpower in the future."[264] Gray openly condemns "those" who have difficulty to understand why the theory matters and "those" who focus on the engineering aspect of the warfare and "insist that airpower must be understood if it is to be done usefully and not irrelevantly as an end in itself."[265] As Col Chamange demonstrates, it is also important to look back at history, to push the reflection further and examine what the future could be, and that discussion and debate on future capabilities are essential.[266] The application of air power has a direct tactical effect while also sending a strong political message. Military leaders advising civil servants and elected officials must carefully balance the requirement at the political level, the taxpayers' expectations, and the military needs. Looking back at history will help in the making of appropriate recommendations and decisions, but those recommendations must be consistently re-evaluated and brought up to date for future potential adversaries and challenges. Air power theorists cannot simply look back at history, but must be proactive. Generating the discussion if niches are good or bad for the RCAF is a step in the right direction. This paper supports the idea of adopting a niche capability air force but also acknowledges that there are some advantages and disadvantages to both sides.

As stated in *Preparing the RCAF For the Future*, "no matter if one is for or against niches, in today's fiscal and complex security and defence environment, it is prudent for the RCAF to explore the niche option to ensure the effective and efficient prosecution of air power on behalf of Canada and Canadians."[267] Discussions on tough issues are hard but essential. Military leaders should be encouraged to openly discuss innovative ideas. While remaining away from politics, it is important to have a healthy debate on the future of the CAF and the RCAF. Whether advertising in favour or against the idea of a niche capability air force, some factors are structural and cannot be debated whilst others are more philosophical in nature. Gray also mentioned that "institutional, reputational, budgetary, and strategic challenges are inalienable from airpower."[268] Gray continues

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[263] Michael J. Boyle, "The Drone Age: how Drone Technology will Change War and Peace"(New York : Oxford University Press, 2020), 424. Disaster RPA can produce useful imagery following natural disaster helping SAR efforts. By creating 3D models of structures and overlapping with thermal imagery, those assets enable to determine if building are structurally unsound and if they should be evacuated. SAR, delivery and imagery are only a few possibilities with RPAs other than delivering kinetic effect.

[264] Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base: University Press, 2012), 267.

[265] Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base: University Press, 2012), 268.

[266] Chamagne, Régis and Richard Wolsztynski, *The Art of Air War* (Lingolsheim: Histopresse, 2006), 11. In the book, Gen Forget praises this approach.

[267] Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations* (Trenton: Royal Canadian Air Force Aerospace Warfare Centre, 2020), 32.

[268] Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base: University Press, 2012), 78.

and states that the "challenge for those who seek to understand airpower is one of choice, or refusal of choice, of paradigm."[269] As no one can predict the future, the balance of probability of future conflicts must also be considered to better orient the future of the RCAF. Both camps – in favour or against – can articulate advantages and disadvantages that are worth exploring.

Adopting a niche capability model does not necessarily mean completely abandoning the full spectrum of operations. A compromise between the status quo and a niche capability would be to review the current mandate of the RCAF, cut the activities that do not directly contribute to Canada's defence as per the defence policy, reduce to the minimum the lines of operations that have a utility but are lacking depth, and finally, develop more depth in the niche capability areas. As Kainikara mentions, the lack of depth may to lead to earlier and greater fatigue of the forces to maintain the operational tempo.[270] As previously demonstrated, the Canadian public generally supports peacekeeping and peacemaking missions over combat missions. Since Canada has an obligation within its NORAD mandate, it must maintain a fighter force. However, there is no obligation outside of NORAD. As an article on the operation in Kosovo in the Canadian Military Journal states, one of the strongest of the political arguments for maintaining a credible fighter force is to avoid or minimize the use of ground forces.[271] The authors also note that although it is expensive "to maintain fighter forces in peacetime, it is politically much cheaper to use them in war."[272] Both of the affirmations have been proven wrong in the war in Iraq and Afghanistan. A coalition with a superior technological advantage operating the latest technology in air power with thousands of soldiers on the ground could barely claim and hold the victory during those campaigns. More recently, when put to work against ISIS, Canadian CF-18s were withdrawn purely on electoral promises. On the other hand, Operation Mobile can be seen as a success from an air campaign's point of view.[273] The operation "demonstrated the effectiveness of various Canadian airpower concepts and capabilities."[274] Canadian air power, enabled by the newly created Air Expeditionary Wing (AEW) offered government and alliances flexible, responsive, and agile effects.[275] Past conflicts have demonstrated that air power has a role to play. This future role is uncertain, but indicators based on the current war in Ukraine points toward large joint and combined coalitions. Adopting a niche capability air force that will ensure that the RCAF as a relevant role to play in future conflict in the success to remain globally engaged.

Advantages

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[269] *Ibid.*

[270] Sanu Kainikara, *The Future Relevance of Smaller Air Forces* (Canberra: Royal Australian Air Force Air Power Development Centre, 2009), 9. Kainikara mentions explicitly that smaller air forces are more susceptible to force overstretch and to being unaware of it because of the necessity to maintain operations at the required tempo on an almost continuous basis without the depth in the force to spread the fatigue to acceptable levels. Therefore, it is of the utmost importance for smaller air forces to institute rigorous procedures to evaluate and ascertain their actual operational competency at frequent intervals.

[271] Lieutenant-Colonel David Bashow, Captain James Pickett, Steve Harris, et al. "Mission Ready: Canada's Role in the Kosovo Air Campaign." *Canadian Military Journal*. Volume 1, Number 1 (Spring 2000), 59. http://www.journal.forces.gc.ca/vo1/no1/doc/55-61-eng.pdf

[272] *Ibid.*

[273] Richard Oliver Mayne, Air *Wing: RCAF Commanders' Perspectives During the 2011 Libyan Conflict*. (Trenton: RCAF History & Heritage, 2018), 17, https://publications.gc.ca/collections/collection_2018/mdn-dnd/D2-401-2018-eng.pdf

[274] *Ibid.*

[275] *Ibid.*

Kainikara mentions that "smaller air forces have to create sufficient depth through their professional mastery to compensate for their lack of mass."[276] As demonstrated in the Reconstitution chapter, the RCAF lacks the *mass*. Kainikara define this mastery as a "force-wide understanding of the broader context of the application of air power."[277] The niche capability model will enable aviators to become master at what they do. The RCAF must adapt to today's reality and consider multiple factors not limited to the current world order that is been threatened, Canada's economy, the Canadian population's will and NATO, alliances, coalitions, and allies' requests. To meet all those requirements, the RCAF must change course and transform into a niche capability air force.

Whether it is appropriate or not, the Canadian population often pictures the CAF as *blue helmet peacekeepers.* As Boucher explains it in *Public Opinion and Canadian Defence Policy*, "peace operations remain at the centre of Canadian identity building."[278] The CAF's contribution to various missions since the new millennium would probably point the average Canadian in another direction. Boucher also argues that "although Canada's contribution to United Nations peacekeeping operations has been marginal in the last 25 years, Canadians still feel attached to this narrative and political parties have both encouraged and instrumentalized this symbol for political purpose."[279] However, politicians and senior military leaders must carefully manoeuvre when trying to persuade the public of the requirement of new military equipment – especially if it is a potentially lethal capability. There is generally no heated debate for search and rescue equipment or anything that is not designed to take a life. Killing and kinetic operations seem to be an issue while enabling others to kill seems to go unnoticed.[280]

As stated by author Alan Stephenson, "given the geographic challenges of protecting Canada, the RCAF currently possesses a range of capabilities that deliver rapid airpower effects throughout the spectrum of Canadian national security."[281] Stephenson also mentions that "limited resources and the high cost of technologically advanced aviation platforms compel the RCAF to provide broad capabilities via multi-purpose aircraft that are combat capable for air force employment in conventional conflicts, but are agile enough for various non-combat

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[276] Sanu Kainikara, *The Future Relevance of Smaller Air Forces* (Canberra: Royal Australian Air Force Air Power Development Centre, 2009), 12.
[277] *Ibid.*
[278] Thomas Juneau, *et al*., *Canadian Defence Policy in Theory and Practice* (Cham, Switzerland: Palgrave Macmillan, 2020), 162.
[279] *Ibid.*
Kainikara also states that Professional mastery of air power involves much more than specialist excellence in a particular function or role. It involves, at a minimum, force-wide understanding of the broader context of the application of air power and demands comprehension of the nation's security environment within the larger international scenario—at the appropriate detail necessary that is commensurate with the level of the individual. The achievement of the minimum required standard of professional mastery—dictated by a number of factors like security threats, capability development, force structure etc.—is completely dependent on carefully directed and all-round education. In conjunction with other essential skills and characteristics, professional mastery within the whole force is a foundational requirement for the evolution of smaller air forces into strategic air forces of influence.
[280] Government of Canada, "Canadian donations and military support to Ukraine", last accessed 01 may 2023, https://www.canada.ca/en/department-national-defence/campaigns/canadian-military-support-to-ukraine.html
[281] Canadian Global Affairs Institute, *The RCAF and the Role of Airpower: Considering Canada's Future Contributions*, last accessed 20 March 2023, https://www.cgai.ca/the_rcaf_and_the_role_of_airpower_considering_canada_s_future_contributions

tasks."[282] What Stephenson really refers to is that the RCAF must be flexible to achieve its mandate by using assets that are capable of accomplishing the mission but not necessarily designed for it. In other words, he means that the RCAF is stretched in various directions without the required assets.

Adopting a niche capability model does not necessarily mean completely abandoning the capability. Indeed, it is possible to maintain a minimum required capability to avoid having the skills fade away while bulking up another capacity. Exchanges between the RCAF and different air forces is also an option to maintain certain skills. The exceeding capacity is what can be deployed and sent internationally on deployment. Adopting a niche capability model is a way to build this exceeding capacity. By focusing on transport, C2, and air-to-air refueling, the RCAF will be able to generate enough crew to build that exceeding capacity and therefore be more engaged in the world.

Another advantage of adopting a niche capability air force is that it would facilitate the relations between DND and the government. Indeed, when presented with the option of deploying forces under the full spectrum of operations, it can sometimes be difficult to decide what is appropriate to deploy simply because all the options are available. By having specific sets of capacities, the discussion on what to deploy is much shorter and eliminates multiple requests for information (RFI) from stakeholders trying to decide and define what to deploy. Internally, the decision would be taken much faster. Externally, countries or alliances requiring assistance would know when to ask Canada and for what. By making it clear that the RCAF would no longer partake in kinetic operations or other mission sets that would be abandoned, there would not be any awkward requests from allies that are denied at the political level. By adopting a niche capability model, the RCAF would also be less subjected to political decisions based purely on politics rather than rational. By reducing the number of possible mission sets, the elected government would have fewer options but the options available would be easier to sell from a political point of view. The contribution warfare mandate of the RCAF would be viewed as enabling others for kinetic operations rather than conducting those operations.

Adopting a niche capability model would also enable the RCAF to foster innovation and encourage creativity in the niches selected. By focusing on a few capabilities, the RCAF could develop new and advanced technologies while improving current tactics and procedures.[283] A better integration of DND and the defence industry could also be beneficial from an economic standpoint. By investing in those niche capabilities, defence contractors could leverage the expertise developed by the RCAF to then export the technology to allies. According to a report on the state of Canada's aerospace industry conducted in 2022, "more than 90% of aerospace manufacturing revenues were export oriented in 2021, of which over 50% were supply chain related."[284] The same report also states that "defence activity represented 17% of total Canadian

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[282] *Ibid.*

[283] J. Paul de B. Taillon, "Canadian Special Operations Forces: Transforming Paradigms", Canadian Military Journal, Winter 2005-2006: 75.
As the author mentions, if properly manned, trained, equipped, and deployed, CANSOF can offer the prospect of a favorably disproportionate return on the military investment. The example of CANSOF can be applied to a RCAF which focusses of specific niches.

[284] Government of Canada, "State of Canadian Aerospace Industry", last accessed 20 April 2023, https://ised-isde.canada.ca/site/aerospace-defence/sites/default/files/attachments/State_of_Canada_Aerospace_report2022.pdf

aerospace revenues in 2020, with Canada's aerospace defence revenues outperforming the global sector between 2018-2020."[285] International independent subject matter experts are also forecasting the global aerospace defence revenues by over 45% between 2021-2025.[286]

The Canadian aerospace industry is healthy and continues to grow despite the setback during the pandemic. In a directed research paper, Cdr Monteiro argues that "DND should articulate it needs from the defence industry in support of the sustainment of the CAF and its future operational success [and that] based on these needs, the Government of Canada would have the rationale and choice to intervene in the defence industry to achieve the long-term needs of DND, notwithstanding its interventions in support of its national economic interests."[287] Having DND and the industry work side by side must be done carefully in order to avoid lawsuits and all the regulations governing international trade must be followed, but it can be done as long as the process follow those rules and is transparent. By leveraging the RCAF niche capability, the Canadian defence industry could be well positioned to build and sell state-of-the-art aircraft and all related systems.

The difference between the current system and a system where the RCAF would have adopted the niche capability model is that that defence industry is also spread out at the moment and not particularly specialized. A parallel can be done with the shipbuilding strategy (or absence thereof) where the Canadian shipbuilders are leveraged in a surged fashion. Having a deliberate strategy where knowledge and experience is learned over time is better than trying to put together a team a rapidly fix a problem. Adopting a national air power strategy based on the capabilities required should unite all political parties and not divide the country. As mentioned by Stephenson, "Prudence needs to be exercised by the government in reconciling political party platform positions with public policy decisions."[288]

Disadvantages

Moving away from a full spectrum of operations has some disadvantages. As with anything, options must be carefully weighed before a decision of this importance can be made. Since the scope of this paper was to explore potential niches, a few disadvantages will be presented shortly and others will be omitted. Counterarguments to any part of this paper could be the subject of lengthy academic studies and for this reason the disadvantages will be quickly mentioned without going too much in detail.

The first disadvantage of adopting a niche capability model is the potential loss of sovereignty. "Although smaller air forces have been able to maintain a balance of capabilities," one study observes, "this has come at the expense of the depth of these capabilities in terms of

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[285] *Ibid.*
[286] *Ibid.*
[287] A.J. Monteiro, "Beyond Jenkins: developing DND's defence industrial base Requirements" (Joint Command and Staff Program Course Paper, Canadian Forces College, 2016), 1.
[288] Canadian Global Affairs Institute, *The RCAF and the Role of Airpower: Considering Canada's Future Contributions*, last accessed 20 March 2023, https://www.cgai.ca/the_rcaf_and_the_role_of_airpower_considering_canada_s_future_contributions

numbers (platforms and personnel) and the related challenge of how long they can sustain operations."[289] This risk presented here is to lower the capacity where the balance is not maintained properly, and depth is inexistent.

The second disadvantage presented is the risk of choosing the wrong niche and lacking the relevance to integrate coalitions. Without the full spectrum of operation, Canada will not be able to provide the deterrence required when affirming support to allied states in Europe or other parts of the world. Should deterrence fail, air power plays a key role in regulating the escalation process.[290] Without kinetic options on the table, Canada's voice will fall on deaf ears.

The last disadvantage presented is that if the RCAF is to move away from a capability, it will take a long time to get it back to an acceptable operational level. As illustrated previously with the RCN and the MV *Asterix*,[291] it is sometimes better to maintain skills at a higher cost than moving away temporarily to rebuild the capacity later.

Conclusion

This chapter explored some options to reduce the workload of the RCAF as a whole and to refocus the efforts on what matters the most. The chapter also weighted some advantages and disadvantages to adopting a niche capability model but most importantly explained why it is important to have those discussions. It has indicated the reasons why the RCAF should adopt this type of model.

The road to a niche capability air force would be bumpy. As alluded earlier in this paper, emotions are often tied to certain capabilities due to the silo in which some RCAF leaders have grown in. The world has changed drastically in the last few decades and the RCAF must now be ready to face a peer enemy. Fighting insurgency has been the main battle of the last two decades. The next enemy could be Russia or China. The good news is that Canada is not alone, and coalitions must be leveraged against enemies such as Russia or China. The challenge for the RCAF is to stay relevant within those coalition and the way to remain relevant is by adopting a niche capability air force.

[289] Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations* (Trenton: Royal Canadian Air Force Aerospace Warfare Centre, 2020), 26.
[290] Canadian Global Affairs Institute, *The RCAF and the Role of Airpower: Considering Canada's Future Contributions*, last accessed 20 March 2023, https://www.cgai.ca/the_rcaf_and_the_role_of_airpower_considering_canada_s_future_contributions
[291] https://www.canada.ca/en/department-national-defence/corporate/reports-publications/proactive-disclosure/secd-state-of-caf-19-april-2021/reference-material/joint-support-shipsmv-asterix.html

CHAPTER 6 - CONCLUSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

In "The Future Employment of Small Air Forces," Kainikara mentions that "there are three basic elements that create the necessary effects that ensure battlefield superiority – ISR, Command and Control and Engagement."[292] The proposed niches in this paper are in line with two of those three basic elements.[293] This paper has identified three fundamental assumptions that have to be accepted as fact. The first one is that the RCAF will always be part of a coalition for large-scale operations. For obvious reasons, the CAF are unable to lead and support large-scale operations. The second assumption is that Canada's foreign policy will continue to align with the Five-Eyes community and alliances such as NORAD and NATO. Accepting this assumption as a fact allows the RCAF to better define what niche can be pursued to better integrate those alliances and coalition. Finally, the last assumption presented was that the RCAF is a small air force and will not grow into a medium air force. For small air forces, the challenge is to be relevant. Maintaining a state-of-the-art air force capable of the full spectrum of operation is unrealistic. To remain relevant and credible to Canada's allies, the RCAF should purse three specific niches.

The following is a synthesis of niches the RCAF can pursue. The first niche is transport. The RCAF currently operated aircraft such as the CC-130J and the CC-177 Globemaster III that are ideal for expeditionary, interoperable with any western world coalitions and are *off-the-shelf* procurement as required. The second niche is the air-to-air refuelling capability. The RCAF operates the CC-130 and the CC-150 in tanker configuration to refuel airborne assets. The idea is to leverage the latest procurement of strategic tankers and increase the capacity to become globally involved in air-to-air refueling operations. The final niche presented is the command and control of air operations. Any air campaign requires a solid command, control, and communication node. The RCAF should pursue the acquisition of AWACS and operate them domestically in a NORAD role and abroad in support of coalitions.

The past successes of the RCAF have been heavily documented and discussed in military journals or academic papers. Much of the literature look back at past campaigns or operations. This paper tried to be innovative by looking forward and suggesting a different path from the Status Quo. Additional research is clearly required but this paper means to at least generate the conversation about a niche capability air force. Other venues that could be cut to save some efforts were not discussed. For instance, the RCAF support to the Skyhawk team falls somewhat in the same category as the Snowbirds to which the recommendation was to disband the Squadron. Another research area is the creation of a deployed wing in Europe to host and employ the spare capacity that would be created by the remodeling of the RCAF. In summary, this paper opens the door to additional study. It is therefore recommended that further research be

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[292] Sanu Kainikara, *Air Power Development Centre. Future Employment of Small Air Forces* (Tuggeranong, A.C.T: Air Power Development Centre, 2005), 31.

[293] Although ISR was not directly addressed, AWACS can provide ISR. ISR assets also require C3 and this is where AWACS become useful whether it is to enable communication relays or to act as as C2 platform.

conducted to determine if the RCAF should continue to train and be employed in the full spectrum of operations.

Annex A - NATO Nations AAR Capabilities[294]

Nation	AAR Receivers	Current Tanker Capability	Future Tanker Plans
ALBANIA	NO		
BELGIUM	YES		MRTT > 2012. No Decision.
BULGARIA	NO		
CANADA	YES	CC150 CC130	CC150 CC130
CROATIA	NO		
CZECH REPUBLIC	YES		
DENMARK	YES		
ESTONIA	NO		
FRANCE	YES	C-135FR KC-135R C-160NG	A-400M (Wing AAR Kit) A-400M (HDU Kit) MRTT
GERMANY	YES	A310MRTT	A-400M (Wing AAR Kit) A310MRTT
GREECE	YES		Possible MRTT. No Decision.
HUNGARY	YES		
ICELAND	NO		
ITALY	YES	KC-767A KC-130J	KC-767A KC-130J
LATVIA	NO		
LITHUANIA	NO		
LUXEMBOURG	NO		

[294] , Joint Air Power Competence Centre, "Air-to-Air Refuelling Flight Plan, An Assessment," last accessed 10 April 2023, https://www.japcc.org/wp-content/uploads/JAPCC_AAR_Flight_Plan_web.pdf

Nation	AAR Receivers	Current Tanker Capability	Future Tanker Plans
NETHERLANDS	YES	KDC-10	KDC-10
NORWAY	YES		
POLAND	YES		
PORTUGAL	YES		
ROMANIA	NO		
SLOVAKIA	NO		
SLOVENIA	NO		
SPAIN	YES	B-707 KC-130H	A-400M (Wing AAR Kit) A-400M (HDU Kit)
TURKEY	YES	KC-135	KC-135
UNITED KINGDOM	YES	TriStar VC-10	A-330MRTT (FSTA)
UNITED STATES	YES	KC-135R KC-10A MC-130P HC-130P/N	KC-X KC-135R KC-10A MC-130P/W MC-130J

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