PREPARING THE **RCAF** FOR THE FUTURE

Defining Potential Niches for Expeditionary Operations

Dr. Richard Goette

National Defence Défense nationale

CANADIAN ARMED FORCES
FORCES ARMÉES CANADIENNES

Canada

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Defining Potential Niches for Expeditionary Operations

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Catalogue Number: D2-420/2020E-PDF
ISBN Number: 978-0-660-32908-6

This publication is available on the intranet at http://w08-ttn-vmweb01/rawc/en/elibrary/index.asp
or at www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/publications.page on the Internet.

Design and editing by the Royal Canadian Air Force Aerospace Warfare Centre Production Section.

Table of Contents

Foreword

Canada's armed forces continue to operate on a global scale, in extremely diverse conditions, in both permissive and non-permissive environments. As we approach the end of this century's second decade, almost every facet of the world we exist in has changed, including military powers, cultures, economics, social media, communications and politics. These changes have both predictable and unpredictable nuances that affect the application of military force. The Canadian Armed Forces (CAF) and, by extension, the Royal Canadian Air Force (RCAF) must apply constant effort and vigilance to understand and prepare for the security-environment concerns of the future. How this is accomplished has always been under scrutiny and debate. One possible option for Canada's air power is that the RCAF transitions to a niche air force, that is, an air force that does not provide capability in all areas of air power but invests in specialized areas and contributes these skills to an allied coalition. This study provides pertinent discussion on the advantages and disadvantages in pursuing a niche air force and discusses the potential and possible niche areas that would best serve the RCAF, specifically, air-to-air refuelling; training and air advisory; personnel; jointness; intelligence, surveillance and reconnaissance; air-expeditionary-wing concept; and targeting.

The core missions of Canadian strategic defence policy have remained essentially the same for many years: *Canadian security, the security of North America* and *contribution to international peace and security*. Content and spending priorities change with the prevailing government administration; however, these core missions have remained intact and will likely remain the *status quo* in the future. The other predominant constant influencing most Western militaries is fiscal in nature. Government restraints and constraints impose limits on defence spending, both in terms of how much funding is provided and where it is directed. These fiscal obstacles affect most aspects of delivering air power, from the actual weapons platforms to the manner in which personnel are selected and trained. Certain pressures may be diminished by becoming a niche air force, as funding could be directed to those areas for which Canada has the talent, need or interest. This study examines those areas of Canadian interest and discusses how the RCAF could specialize in some of these capabilities. If Canada comes to this crossroad, this study certainly provides the insight required for analysis and debate.

A significant influence in global affairs lies with the emergence of new regional powers and the re-emergence of others. The effect is the potential for peer-to-peer and near-peer conflicts. Anti-access area denial (A2/AD) is a relatively new term that describes modern adversary techniques that hinder the force projection of Western power. These techniques are seated in advanced technology that, until recently, was a long-standing advantage that no longer resides exclusively in the Western corner of the world. As the adversarial technology gap diminishes or enters new realms of technology beyond that which is generated within the Western world, internal and external security concerns open new challenges, concepts and opportunities. The author weaves the A2/AD concern throughout this study, with almost thematic regularity, and illustrates the inextricable link to force-projection exploits. A niche air force is based upon the strength of the sum of its parts. Other allied nations subscribing to the coalition all contribute to the agreed areas of specialty, with the intent to deter and, if necessary, defeat the adversary imposing A2/AD measures by employing A2/AD countermeasures.

This study makes it clear that the present and future security environments will persist in challenging Canadian and allied air power and force projection. How these challenges will be met is the subject of debate by defence scientists, academics and members of the military team. As presented by this study, one option is becoming a niche air force. The platforms, roles and the combinations therein are numerous. Discussion must occur and difficult questions must be asked as we seek to find and establish our position within the future of air power. As you will read, the opportunities are dynamic, as are the risks.

Colonel S. Elder
Commander
Royal Canadian Air Force Aerospace Warfare Centre

1
Introduction

The RCAF conducts operations on a global scale in support of Canadian interests and national objectives. This study defines expeditionary niches in which, under government direction, the RCAF could ally with its peers, understandably while maintaining the first-principle responsibility to safeguard Canada. It does so based on an analysis of geopolitical and military trends, Government of Canada defence priorities as well as current or near-term RCAF capabilities.[1]

Since 11 September 2001, warfare efforts at all levels have been legitimately focused on a variety of cunning and remarkably persistent asymmetric threats. Indeed, for a whole generation of new RCAF recruits, all battlefield focus has been within the Middle East; it is all they know. Recent geopolitical and military trends, however, and the rise of new international challengers to American-led Western military dominance mean that CAF, and by extension the RCAF, will need to prepare for the increasing likelihood of near-peer or peer-versus-peer conflict. Although large-scale conventional war between major powers is unlikely due to the varying "degree of interconnectedness and interdependence that currently characterizes the international system," state-versus-state war cannot be ruled out due to the fluid nature of international relations and the enduring potential for "crises, miscalculations and conflicting national goals" and interests to escalate.[2] As the CAF's *Future Security Environment 2013–2040* document notes, "as an instrument of Canada's national power, the CAF must be able to deploy globally, often in unstable areas to contribute to the Government's foreign policy and national security objectives in order to defend Canada and Canada's interests."[3] The RCAF must, therefore, be prepared to deploy on expeditionary operations[4] that the Government of Canada deems are in Canada's interests. Air power's characteristics of speed and reach mean that the RCAF will be an essential primary option for the government.

In deploying on expeditionary operations, the RCAF should anticipate operating on the whole spectrum of conflict. Operations during the 21st century span the entirety of this spectrum, ranging from peace/peacetime military engagement to major combat and war.[5] The complexity of conflict in the post-9/11 environment saw numerous fluctuations, notably shifting away from "traditional" peacekeeping / peace support operations (PSOs)

and more towards United Nations (UN)-mandated interventions. These missions have required a more robust force and posture, and professional militaries have been forced to adapt to and be more agile to operate across the spectrum of conflict. This includes the RCAF, which—currently and in the near future—will have to respond across the full spectrum of possible operations, ranging from "supporting OGDs [other government departments], humanitarian aid and disaster relief, establishing an authoritative presence and demonstrating resolve, coercive diplomacy, and ultimately, combat."[6]

It is highly unlikely that Canada will act alone in expeditionary operations. Therefore, the RCAF should anticipate operating as a member of a multinational alliance or coalition. It is likely that Canada will operate as a member of a coalition in which the United States (US) is not only a part but will probably lead. Since the US is Canada's most important ally and coalition expeditionary partner, ensuring interoperability with that nation's armed forces and, in particular, being able to "plug and play" with the United States Air Force (USAF) should be an essential RCAF consideration.[7] However, although the US remains the world's only superpower for the foreseeable future, its ability to support allies may be more restrained due to the requirement to confront the rise of regional powers and fiscal restraints.[8] Therefore, the RCAF should also prepare to operate on expeditionary operations in a coalition in which the US is not a member or will provide only limited support.[9] The RCAF should also anticipate that the US will call on other countries, such as Canada, to make greater contributions to coalition operations.

In today's complex security and defence expeditionary environment, nobody can "go it alone." This necessitates that countries such as Canada operate in a coalition construct to ensure mutual reliability, strength in numbers and a high level of legitimacy.[10] "Multilateral cooperation and alliances," *Future Security Environment* notes, "will remain an enduring feature of the international environment."[11] This is especially the case with the North Atlantic Treaty Organization (NATO), as alliance challenges may lead to Canada being called upon to buttress its NATO allies and make a more worthwhile contribution to coalition operations.[12] Given CAF's relatively small size (and by extension the RCAF's), it is unlikely that Canada will play the largest or a leading role in a multinational coalition (NATO-led or otherwise). The challenge for RCAF expeditionary forces will, thus, be to provide specific capabilities as a junior partner in a coalition construct that not only make a valuable contribution to the overall effort but also reflect Canadian interests.[13] It is therefore important to study RCAF expeditionary capabilities and identify possible niche areas. Accordingly, this book will first discuss the important context of the complex security and defence environment the RCAF faces in expeditionary operations and identify particular challenges related to growing conventional threats. It will then examine the concept of niches, analysing the possible advantages and disadvantages of this type of approach for the RCAF. Lastly, this book will explore possible niches that the RCAF may want to consider pursuing if it decides to adopt an expeditionary niche approach.

NOTES

1. Although this study was completed before the release of *Strong, Secure, Engaged: Canada's Defence Policy* (*SSE*), there are no major inconsistencies between this study and the defence policy. Canada, Department of National Defence (DND), *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: Minister of National Defence, 2017), accessed May 3, 2018, http://dgpaapp.forces.gc.ca/en/canada-defence-policy/index.asp.

2. Canada, DND, A-FD-005-001/AF-003, *The Future Security Environment 2013–2040* (Ottawa: Chief of Force Development, 2013), 3, accessed May 3, 2018, https://collaboration-admpa.forces.mil.ca/sites/DI/Organizations/vcds/cfd-dgcsi-future-security-environment-2013-2040.pdf.

3. Canada, DND, A-FD-005-001/AF-003, *The Future Security Environment 2013–2040*, 3. This document defines conventional war as "state-on-state conflict employing standing armed forces, not involving the use of nuclear weapons" and irregular war as "conflicts involving at least one non-state actor as a primary belligerent." Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 92.

4. The term "expeditionary" is defined in the RCAF *Future Air Operating Concept* as "operations outside of Canadian or continental territory and approaches." Canada, DND, *Future Concepts Directive Part 2: Future Air Operating Concept* (Trenton, ON: Canadian Forces Aerospace Warfare Centre [CFAWC], 15 August 2016), 10, accessed May 3, 2018, http://rcaf.mil.ca/assets/RCAF_Intranet/docs/en/d-air-rdns/future-air-concept/future-air-operating-concept-160908-with-signature-mod.pdf. Hereafter cited as Canada, DND, *FAOC*. Draft RCAF expeditionary-operations doctrine supplements this definition, noting, "In the context of air operations, an expeditionary operation is any operation conducted away from the main operating base. Expeditionary operations may be conducted from a domestic, continental or international location." Canada, DND, B-GA-402-005/FP-001, *Expeditionary Air Operations Doctrine*, Final Endorsement Draft / Version 2 (Trenton, ON: CFAWC, 2 September 2016), 1-1. This definition is taken from the *Defence Terminology Bank* (*DTB*) record 34907, definition note 1. Building on the draft expeditionary-operations doctrine, a recent RCAF doctrine note also offers a useful elaboration of the concept of expeditionary operations: "the projection of military power over extended lines of communications into a distant operational area to accomplish a specific objective." Canada, DND, Royal Canadian Air Force Air Doctrine Note (ADN) 16/01, Tactical Aviation Mobility and First-Line Support (Trenton, ON: CFAWC, 2016), 2, accessed May 3, 2018, http://w08-ttn-vmweb01/cfawc/en/doctrine/index.asp. This definition was also taken from *DTB* record 34907.

5. Canada, DND, B-GJ-005-300/FP-001, CFJP 3.0, *Operations* (Ottawa: Canadian Forces Warfare Centre, September 2011), 2-12, accessed May 3, 2018, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560; and Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors* (Ottawa: Director General Air Force Development, 2014), 15, accessed May 3, 2018, http://rcaf.mil.ca/en/d-air-plans/rcaf-vectors.page.

6. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 115.

7. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 6, 86–87; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 14; Richard Goette, "Command and Control Implications for Canadian Forces Air Expeditionary Operations," in *Canadian Expeditionary Air Forces*, ed. Allan D. English, Bison Paper no. 5 (Winnipeg: Centre for Defence and Security Studies, University of Manitoba, 2004), 67; General R. R. Henault, "Jointness, Expeditionary Force Projection and Interoperability: The Parameters of the Future," in English, *Canadian Expeditionary Air Forces*, 6; Brad W. Gladman, "The Future of Allied Air Power: The United States Air Force," DRDC Scientific Report DRDC-RDDC-2014-R82 (Trenton, ON: CFAWC and DRDC Centre for Operational Research Analysis, October 2014), 46, accessed May 3, 2018, http://pubs.drdc-rddc.gc.ca/BASIS/pcandid/www/engpub/DDW?W%3DSYSNUM=800666&r=0; and Canada, House of Commons, Standing Committee on National Defence, "Evidence – Lieutenant-General Michael Hood" (42nd Parliament, 1st Session, 14 April 2016), 4, accessed May 3, 2018, http://www.ourcommons.ca/DocumentViewer/en/42-1/NDDN/meeting-7/evidence.

8. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 4–6; Gladman, "Future of Allied Air Power: The United States Air Force," 9–11; and US, USAF, "USAF Posture Statement 2016" (presentation, US Senate, Committee on Appropriations, Subcommittee on Defense, February 10, 2016), 3, accessed May 3, 2018, http://www.af.mil/Portals/1/documents/airpower/FY16_AF_PostureStatement_FINALversion2-2.pdf.

9. Goette, "Command and Control Implications," 67. In fact, this is precisely what happened during Operation UNIFIED PROTECTOR (OUP), as the US transferred leadership of the mission to the North Atlantic Treaty Organization (NATO)–led coalition early in the campaign. Richard O. Mayne, "The Canadian Experience: Operation Mobile," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica, CA: RAND Corporation, 2015), 253–54, accessed May 3, 2018, https://www.rand.org/pubs/research_reports/RR676.html; and Dr. Christian Anrig, "The Quest for Relevant Air Power – Continental Europe," *Royal Air Force Air Power Review* 12, no. 1 (Spring 2009): 78, accessed May 3, 2018, http://www.airpowerstudies.co.uk/id2.html.

10. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 88.

11. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 22.

12. On Canada's contribution to NATO, see LCol John Alexander, "Canada's Commitment to NATO: Are We Pulling Our Weight?," *Canadian Military Journal* 15, no. 4 (Autumn 2015): 4–11, accessed May 3, 2018, http://www.journal.forces.gc.ca/vol15/no4/index-eng.asp.

13. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 87–88; and Goette, "Command and Control Implications," 74.

2
Context and Challenges

MILITARY ROLES, STRATEGIC PRIORITIES AND FIRST-PRINCIPLE RCAF RESPONSIBILITIES

Over the past several decades, Canada's military has performed three enduring, traditional roles. They are, in order of priority: defending Canada, defending North America in conjunction with the US, and contributing to international peace and security.[1] While the first two roles are compulsory (i.e., "no fail"), the third one (which embodies expeditionary operations) is discretionary. There is, therefore, potential that the compulsory roles may have negative consequences on RCAF expeditionary capabilities; though, this is not as much of a concern as one may think.

Providing disaster relief is both a domestic (i.e., responding to Manitoba floods) and international (i.e., Haitian post-earthquake assistance) operation that the RCAF undertakes with joint, integrated, multinational and public (JIMP) partners. Airborne search and rescue (SAR) is a vital domestic role the RCAF performs, while supporting UN peace operations is an important international commitment. These all resemble non-kinetic or "soft-power"[2] CAF missions that, according to opinion polls, are very favourable with Canadians.[3] Nevertheless, the complex challenges of the current security and defence environments mean that the CAF will need to be able to conduct operations across the spectrum of conflict. For expeditionary operations, this would include non-kinetic, soft-power undertakings, but it could also entail combat operations in some of the most troubled areas of the world—including those in support of human security and the protection of civilians, which have been at the forefront of recent PSO mandates. A notable example is the extensive RCAF involvement in the NATO-led and UN-sanctioned Operation UNIFIED PROTECTOR (OUP) in Libya in 2011. Although it was a joint campaign, it was "air heavy" and was based on United Nations Security Council Resolution 1973, which authorized participating nations "to take all necessary measures…to protect civilians and civilian populated areas under threat of attack."[4] Accordingly, even though soft power may be the preferred approach in Canadian UN PSOs, maintaining a hard-power, kinetic combat capability will also be necessary to

ensure the protection of civilians. In doing so, however, the RCAF must also be aware of other strategic considerations.

The Canadian government will likely want to avoid protracted deep engagements (i.e., counter-insurgency [COIN] missions such as Afghanistan) "that tie up capability and limit Canada's flexibility to employ its military to address emerging threats." Instead, Canada will likely want to consider "micro-engagements" with "concrete, achievable, and well-scoped objectives," thereby giving Canada the flexibility needed to address a variety of developing threats.[5] Desire may not reflect reality, however, in that protracted engagements will likely be unavoidable. The RCAF will therefore have to determine the best way it can contribute to protracted COIN-type engagements in addition to possible micro-engagements. Furthermore, while remaining interoperable with its traditional joint and combined military partners, the current complex security environment and the subsequent requirement to conduct operations across the spectrum of conflict means that the RCAF must also work well with other, non-military partners. The RCAF should therefore be cognizant of ensuring a whole-of-government (WoG) capability when operating with OGDs and a JIMP approach, which is consistent with the RCAF's "Integrated" vector in *Air Force Vectors*.[6]

Resource constraints at the national strategic level remain a perennial challenge for modern air forces, and the RCAF is no exception. The pressure on governments to spend more on social programmes and stimulating the economy can often lead to limitations on defence spending.[7] Yet for countries that wish to remain engaged in international affairs and participate in multinational endeavours, this also places pressure on military capabilities. For the RCAF, this situation has resulted in a familiar paradox: greater government demands for military capabilities leading to a high operational tempo, but fewer resources with which to engage.[8] The RCAF, accordingly, needs to recognize such limitations by being more efficient and creative with its funding and further justifying its expeditionary capability requirements.

The RCAF has a first-principle responsibility to safeguard Canada and defend the continent in cooperation with the US.[9] Expeditionary operations are discretionary,[10] and Canada's rather secure geostrategic situation in North America—allied to the most powerful nation on Earth, which also happens to be Canada's closest trading partner—not only means that Canada has the luxury of deciding when and where it can deploy its military on expeditionary operations, but also how much it can spend on them.[11]

Such factors bring forth questions regarding the balance of developing air power capabilities for domestic versus expeditionary roles. Sanu Kainikara, an air power academic at the Royal Australian Air Force's (RAAF's) Air Power Development Centre, captures this dilemma nicely:

> The vexed question facing all smaller air forces is whether to orientate force structure development for the ironclad requirement to fight and win wars of necessity, i.e.

> defence of the sovereignty of the nation against conventional attack, or to emphasise the capabilities required to provide humanitarian assistance and contribute to coalition operations that seem to be the current need of the hour. There is no doubt that, in order to retain long-term relevance, smaller air forces must structure for the most dangerous scenario while retaining the flexibility to undertake operations of choice by building-in inherent adaptability, versatility and innovative capabilities. Such an air force will be able to contribute meaningfully in all eventualities.[12]

The advantage for Canada, however, is that its geography and the nature of air power operations within the country bode well for an expeditionary focus for RCAF capabilities. As former RCAF Chief of the Air Staff Lieutenant-General (LGen) Angus Watt once noted, "Canada is so big that even inside our own country it is an expeditionary mindset, just to get from A to B and to continue operations."[13]

CAF's definition of an expeditionary operation is "the projection of power over extended lines of communications into a distant operational area to accomplish a specific objective."[14] It could also be applied to many RCAF domestic operations in Canada. Indeed, the huge distances involved in many domestic RCAF operations give them a distinctly expeditionary flavour. This is especially the case for air mobility operations, and in particular Operation (Op) BOXTOP's annual resupply of Canadian Forces Station Alert has recently been characterized as a "domestic expeditionary operation."[15] The implications for this for RCAF expeditionary operations are that many of the capabilities needed for domestic first-principle roles are transferrable to expeditionary roles.[16] Put differently, the development of a number of RCAF expeditionary capabilities do not conflict with the air force's first-principles roles but are, in fact, complementary and, it could be argued, enhance them.

ADVERSARY CHALLENGES

A2/AD

In preparing for the increasing possibility of near-peer or peer-versus-peer conflict, the RCAF will have to keep a high-intensity scenario—in which an adversary employs A2/AD systems and networks—at the forefront. A2/AD is aimed directly at Western expeditionary capabilities to project power. The RCAF's *Future Air Operating Concept defines it as follows:*

> Anti-access is defined as "Action intended to slow deployment of friendly forces into a theater or cause forces to operate from distances farther from the locus of conflict than they would otherwise prefer. A2 affects *movement to a theater."* Area-denial is defined as "Action intended to impede friendly operations within areas where an adversary cannot or will not prevent access. AD affects *maneuver* within a theater."[17] [emphasis added]

A2/AD capabilities are based on advanced science and technology, and rising regional powers (such as Russia, China and Iran) have utilized their growing economic strength to develop domestic capabilities or purchase foreign A2/AD systems and networks. This poses a serious challenge for the US and its allies, including Canada. Whereas Western forces previously had enjoyed the ability to forward deploy to bases and sustain them by means of relatively secure lines of communication, fiscal challenges and growing adversary A2/AD capabilities have placed limits on this freedom. A2/AD not only targets military capabilities in the physical land, sea, air and space environments but also disrupts situational awareness in the virtual cyber and electromagnetic environments. This means a cross-domain contested environment where every target is at risk, and "the most sophisticated [A2/AD] systems will be networked to create an interdependent, redundant, and comprehensive operational capability."[18]

Actors (such as Russia, China and Iran) have commenced acquisition of advanced technology to specifically counter US advantages by limiting access to areas (i.e., Western Pacific, Persian Gulf, etc.) and/or by attempting to make the costs of assuring and maintaining access prohibitive. The US has made a conscious decision to counter the A2/AD challenge by developing concepts supported by advanced technology and capabilities.[19] This places pressure on allies such as Canada to keep up with these expensive sophisticated technological developments and to be creative in their employment if they wish to remain interoperable with the US and be an effective coalition contributor.[20] As defence scientist Brad Gladman has noted, "those whose platforms are not low observable or cannot cope with the threats posed by A2/AD environments or advanced air defences may well find themselves a liability to future coalition operations."[21]

The ability to be seamlessly interoperable with the US—and in particular USAF— is the RCAF's cornerstone priority because of its NORAD responsibilities. It is also essential to ensure effectiveness in NATO and other multilateral coalition operations.[22] The RCAF fighter force currently maintains a high standard of interoperability with USAF, but its CF188s are scheduled to be stood down in the near future, thereby necessitating cognizance of future interoperability requirements. As RCAF Commander LGen Michael Hood remarked to the House of Commons Standing Committee on National Defence in April 2016, "with the complexity of the signals environment, the way aerial warfare is evolving, interoperability today and into the future will be a very important factor."[23] It behoves the RCAF to invest in advanced technology and capabilities to remain not only current with its most important ally to ensure NORAD interoperability but also interoperable with other allies for expeditionary operations.

Fifth-generation technology goes beyond mere platforms and can be described as an entire system with a huge data flow to manage a networked joint force. Being interoperable in a coalition will, therefore, require the fifth-generation capability to plug into this system and integrate with allies.[24] This was clearly demonstrated during the Trilateral Airpower Exercise between assets of the Royal Air Force (RAF), the French Armée de l'Air and USAF's 1st Fighter Wing in December 2015. Premised on a contested-airspace A2/AD

environment, the exercise demonstrated, in the words of USAF Chief of Staff General Mark Welsh, that "interoperability among allies, and deconfliction in the operations of air forces in close proximity is crucial."[25] One of the exercise's most important takeaways was how the horizontal communications networking capabilities of fifth-generation aircraft, such as the F-22 and F-35, allowed for the orchestration of the entire force, enabling it to work together as a system, thus carrying out the mission-assurance role.[26] Therefore, to be successful in future A2/AD scenarios, Canada should ideally endeavour to develop a fifth-generation air force along the lines of the Australian example, as embodied in the RAAF's Plan Jericho.[27]

Control of the air is one of the—if not the most—fundamental core capabilities of air power.[28] Nonetheless, one critical challenge of operating in an A2/AD scenario is that there is no guarantee that the luxury of air superiority that Western air forces have enjoyed in campaigns over the past 25 years can be achieved.[29] As the Director of the NATO Joint Air Power Competence Centre (JAPCC) General Frank Gorenc noted in 2014, "we tend to take some things for granted, like air superiority. But in an A2/AD environment—the kind of layered long-range defense being built by Russia, China, and to a lesser extent Iran—we would have to *earn air superiority."*[30] [emphasis added] The RCAF will, thus, potentially have to operate in contested and degraded environments in future kinetic expeditionary operations. Moreover, it is not only a challenge for the RCAF: land and sea forces (plus headquarters elements) all rely on air superiority to ensure freedom of manoeuvre and action. They, too, would also have to face the challenge of operating in a degraded environment.[31] As the RCAF's *Future Concepts Directive Part 2: Future Air Operating Concept (FAOC) n*otes, "success in an A2/AD environment will require a philosophical shift in what constitutes an acceptable level of air, space and maritime superiority as well as acceptable levels of risk. Temporary or local control of the air or the sea are much more realistic expectations than complete freedom of manoeuvre in all domains."[32] Therefore, the inability to achieve air superiority in an A2/AD environment is not just an air-force challenge; it is also a joint one, as land and sea forces, too, have also grown accustomed to operating in an uncontested air environment.

For instance, suppression of enemy air defences (SEAD) is an important prerequisite for a successful air campaign to ensure the safety of air crews and freedom of action for operations. Notably, in recent air campaigns SEAD is usually achieved before RCAF assets are employed either because a) there are minimal enemy air defences to begin with (i.e., in the case of Op IMPACT) or b) allied air forces have already suppressed most enemy air defences before the arrival of RCAF assets in theatre (i.e., Op MOBILE).[33] Operating in an A2/AD campaign against integrated air defences in which SEAD efforts have not been completely successful and air superiority is still being contested offers a variety of challenges for the RCAF. For one, it would necessitate a robust defensive suite and/or low-observability capabilities for its platforms to shield them from threats. For another, it would also require capabilities to exploit the electromagnetic spectrum to protect RCAF forces and degrade those of the enemy.[34] It would also place pressure on allied combat search and rescue abilities (the RCAF does not currently possess this

capability). For instance, during Op MOBILE, on 11 September 2011, RCAF CF188s became the first allied aircraft to operate below the personnel-recovery line in OUP.[35] Arguably, this would not be possible in a degraded A2/AD environment.

Operating in a degraded environment, such as in an A2/AD situation, also brings forth the difficult issue of sustaining losses. Governments have become accustomed to relying on air power to deliver effects without incurring losses. This is a "blessing" for air forces because it has meant that air power is quite often the government's first choice to utilize in a crisis situation. However, it is also a "curse" because it places huge expectations on air forces to deliver such effects with no losses—something that cannot be guaranteed in the non-permissive environment of a technologically sophisticated A2/AD situation.[36] Possible attrition of platforms is a difficult challenge for the RCAF, given that it has a finite number of aircraft available to perform Canada's varied air power responsibilities, and losses will seriously impact its ability to deliver the full range of the nation's air power effects. However, attrition of personnel is an even greater concern. This relates to the challenge of generating replacement personnel but even more importantly to the cognitive and emotional costs of not only the RCAF but also the loved ones of fallen air personnel. Furthermore, there is the potentially damaging psychological effect on the nation in today's casualty-averse Canadian society. Put simply, would Canada (government and people) have the national will to continue the fight if it experienced a high number of casualties? This issue of strategic intolerance to attrition of limited assets must be addressed if the RCAF is to operate in an A2/AD environment.[37]

RUSSIA

One possible adversary Canada may have to face—especially in a NATO Article 5 scenario—is Russia. Formerly a NATO Partnership for Peace participant, Russia in the past decade has begun building its military capabilities to challenge the West and, in particular, to counter what it sees as NATO encroachment on its spheres of interest. Notably under President Vladimir Putin, Russia desires to gain back the power and influence it wielded during the Cold War as the Soviet Union. It is, therefore, likely that Russia, in the words of CAF's *Future Security Environment 2013–2040,* "will remain a global power wielding significant influence on international affairs" for the foreseeable future.[38]

The growing Russian threat is a particular concern for Canada's European NATO allies. There has been talk of establishing "a new normal in NATO," due to growing Russian aggressiveness and the much superior conventional capabilities they possess compared to foes faced by NATO-led coalitions in the past.[39] Recent Russian aggression in the Ukraine and growing flights of Russian military aircraft over European international waters (and also the Arctic) have increased allied diligence, leading to enhanced measures such as the growing importance of Baltic-air-policing missions and other measures to deter Russia.[40] But part of the challenge is the fact that several European countries are dependent on Russian energy imports, placing them in a precarious situation vis-à-vis any aggression on the part of their eastern neighbour. This includes the former Soviet

republics—some of which are now the newest NATO members—on Russia's periphery, which is where Russia's main interests lie. In some cases, this posture has resulted in direct intervention, ranging from conventional military combat in Georgia, to a hybrid warfare approach in Ukraine, to an alleged cyberattack on Estonia. There are fears that some NATO nations with large Russian populations, such as Poland and the Baltic states, may be Russia's next targets.[41]

NATO's North American members are also concerned about Russia's military posturing. Growing Russian submarine activity in NATO waters poses serious sea-denial concerns and a potential threat to sea lines of communication.[42] Russian posturing has also resulted in greater military activity (soft but also hard power) and increased basing in the Arctic, including establishing a Russian Arctic military command. This has led to a growing number of intercepts of Russian bombers close to Canadian and American airspace by USAF and RCAF fighters.[43] The results have been more emphasis being placed on NORAD to ensure North American defence and greater RCAF emphasis on its first-principle role to protect Canadian territory and sovereignty.[44]

As it attempts to achieve parity with the West, Russia has increased its military spending from 3.2 percent of its gross domestic product in 2013 to close to 5 percent. Focused on professionalization initiatives and technological advancements, Russia's military modernization gives the country potent capabilities. Although Western sanctions and the recent drop in the price of oil (Russia's major export) have damaged the value of the ruble, it has not seriously impacted Russia's military modernization. In fact, Putin's nationalist approach, which has accompanied Russia's military resurgence, is popular among the Russian people, leading to greater public support for their armed forces and the country's more aggressive posture.[45]

Russia's military modernization has resulted in the development of a wide range of Russian Air Force air power capabilities that permit it to implement an A2/AD approach—notably in the Baltic region. This has included the development of a fifth-generation fighter (the Su-57); enhancements to its existing fighter and fighter-bomber fleets (notably improved Su-27s and the fielding of the Su-34); advanced cruise missile and surface-to-air missile (SAM) systems; state-of-the-art mobile dispersed radar and jamming capabilities; and a variety of growing rotary-wing, naval aviation and supporting capabilities.[46] In particular, Russia has used the opportunity of supporting allies to showcase its military capabilities. For instance, Russia's deployment to Syria demonstrated Russia's bombing, SAM and stand-off strike capabilities.[47] Moreover, Russia has also shown its willingness to utilize its own form of hybrid warfare, mixing conventional means, intimidation, cyberattacks, disinformation and propaganda to confuse and dislocate an enemy.[48] Russia's use of hybrid warfare in the Ukraine and the fact that only a very small number of its air strikes in Syria were precision strikes have demonstrated that it has a very different idea of what is appropriate in war in terms of adherence to the law of armed conflict (LOAC) and collateral damage.[49] This is a significant challenge for Western countries (such as Canada), which strive for higher standards in these areas.

Lastly, it must not be forgotten that Russia has a robust arms industry that can benefit other potential adversaries. As the *Future Security Environment notes, "Russia will likely continue to utilize its military and technological expertise to bolster diplomatic and economic influence through the export of military capabilities."*[50] Other nations will, therefore, utilize Russian military systems, raising the possibility that the RCAF will have to be prepared to operate in a contested air environment.[51] In fact, during Op MOBILE, the RCAF faced opponents who possessed Russian equipment.[52] Maintaining close attention to Russian military advances and developing means to counter them will, therefore, continue to be key considerations for the RCAF as it prepares for future expeditionary operations.

CHINA

Another possible adversary the RCAF has to be cognizant of is China. As the *Future Security Environment* notes, China's growing economy has encouraged it to "increase its global diplomatic, financial, and economic influence and that such development will also allow significant opportunity to fund the enhancement of its military instrument of power."[53] Spurred by its growing power, China seeks greater influence in the Western Pacific. In particular, China has chosen to develop A2/AD capabilities (which it terms *shashoujian* or "assassin's mace"), has defended what it views as its own airspace (i.e., it established an air identification defence zone in the East China Sea in 2013) and has limited American freedom of action and power-projection capabilities to assist its allies in the region. Although China wishes to avoid sustained conflict that might damage its economic growth, its growing power has resulted in greater Chinese assertiveness in the Western Pacific—notably the South China Sea—which has increased the possibility of confrontation.[54]

China's approach has been described as an "unrestricted warfare strategy." Its focus is on negating Western (notably American) economic and conventional military superiority by conducting warfare not only in traditional conventional means but also in non-military spheres (based on Sun Tzu's indirect approach). The unrestricted aspect of China's approach entails the objective of impacting all areas of life of affected countries (i.e., cyber, as globalization has created vulnerabilities that can be targeted, including in Canada). This approach views the battlefield as being "everywhere." That is, armed force will not be the only option; all means—military and non-military, lethal and non-lethal—will be used to compel the enemy to accept China's interests.[55] Conventionally, China's approach includes a "long-term comprehensive military modernization program designed to improve the capacity of its armed forces to fight and win short-duration, high intensity regional military conflict."[56] China, too, has fielded a fifth-generation fighter, the J-20, and it also currently possesses a wide array of A2/AD capabilities, including advanced SAMs; bombers; short-, medium- and intermediate-range missiles; submarines; advanced radar systems; remotely piloted aircraft (RPA); air-launched cruise missile systems; and antisatellite missiles.[57] Although China's growth is dependent on the peaceful resolution of conflicts in the region and, in particular, maintaining the open seas for commerce, there is potential that conflicts may escalate into military action, thereby necessitating an American military response.

The American reaction has been to rise to China's challenge. This "pivot to Asia" has included efforts by the US military to counter A2/AD, which includes the Joint Operational Access Concept (JOAC), Joint Concept for Access and Maneuver in the Global Commons (JAM-GC, previously known as AirSea Battle) and the Joint Concept for Entry Operations (JCEO). Their objective is to increase American capabilities to project power into the Western Pacific and to ensure sufficient freedom of action for joint and coalition forces to reassure allies in the region.[58] All not only emphasize operations in which air power plays a vital role in the joint fight but also stress the need for high levels of networked and integrated operational employment as well as the capability to operate and counter threats in an environment in which all domains will be contested by the enemy.[59] Lastly, China is not only an importer of Russian military technology but also an exporter of its own military technology.[60] Therefore, the RCAF's requirement to prepare to counter advanced military systems and operate in a contested environment also applies to China.

Possessing the means to counter Chinese A2/AD capabilities is essential in not only ensuring freedom of action in the Western Pacific in the event of hostilities but also avoiding conflict by means of deterrence.[61] Moreover, the US desires greater collaboration with its Asia–Pacific allies (including Canada), understanding full well that the success of its endeavours in the region depends on a coalition effort.[62] These factors—in addition to Canada's increased attention towards Asia–Pacific issues (economic, human security and defence [such as the 2013 Canada–US Asia Pacific Defence Policy Cooperation Framework]) and the increasing geostrategic importance of the region—mean that the RCAF may be required to engage in additional US–led exercises in the region other than the current RIMPAC commitment[63] and "to project and maintain forces in that area as it may serve future GOC [Government of Canada] interests."[64]

IRAN

Iran is also a potential adversary bearing consideration. With a cultural composition of Persian peoples following the Shiite brand of Islam, Iran is eschatology-driven, in that there is a strong sense of nationalistic pride and a desire for an ultimate destiny or purpose in the world. In particular, Iran projects a strong sense of identity to distinguish itself from the Arab, and largely Sunni, Gulf-region states. This also makes Iran a security threat, in that its identity and pride combined with its vast oil and gas reserves have resulted in regional power ambitions. Iran's quest for regional power, its related desire to develop nuclear weapons and its state-sponsored terrorism agenda have further enhanced it as a threat in the region, thereby drawing the ire of the US.[65]

Iran is also pursuing an A2/AD strategy, though on a smaller scale than China. Termed the "mosaic defence strategy," Iran is focusing on multidimensional asymmetric operational capabilities aimed at deterring the US and its regional allies and disrupting their military capabilities in the geographically restricted Persian Gulf (notably the bottleneck Strait of Hormuz) to enhance Iranian regional power. This is to be done by emphasizing

protracted war that will make the human and material price to the enemy so costly so as to compel them to abandon their objectives and withdraw. Although not on the same scale as China's A2/AD capabilities, Iran still employs a variety of military systems developed domestically or acquired from other states (such as Russia and China) that merit attention. This includes sea mines, anti-ship cruise missiles, submarines, ballistic missiles and "small boat 'swarming' attacks on US warships in the Strait of Hormuz seek[ing] to make entry into the Persian Gulf to ensure the flow of oil far more costly. In so doing, the confidence of US regional allies will be reduced, increasing Iranian regional power."[66] The overall emphasis on deterrence is the primary reason why Iran is seeking nuclear weapons. Furthermore, in addition to conventional and nuclear capabilities, Iran's mosaic defence strategy also includes a hybrid warfare aspect, which entails the use of proxies such as Hezbollah (i.e., Lebanon 2006 war), sleeper cells, terrorists as well as the use of media and information warfare to achieve deterrence (i.e., advertising exercises in the Strait of Hormuz).[67] Although Canada is currently seeking to re-establish diplomatic relations with Iran, it must also be cognizant of Iranian military capabilities and their potential to destabilize the Middle East region.

Implications

The recent Russian resurgence, Chinese actions in the Western Pacific and Iranian posturing indicate that state-on-state war involving great powers is a possibility that definitely cannot be ruled out. Although such a scenario may seem remote, it is still one for which the RCAF must prepare to contribute to if asked. NATO and other alliance structures will be needed to deter such conflict, and the UN and other international organizations will be required to address growing instability in various parts of the globe. Canada—and by extension the RCAF—will, thus, be required to participate in allied and coalition efforts on expeditionary operations to contribute to international crisis management, peace and security.[68]

Although some of the adversaries and foes that CAF has faced in the past have or may utilize hybrid or irregular approaches, it would be folly to completely reorient Canada's military away from conventional warfighting capabilities. To do so would overlook the serious conventional capabilities of these adversaries/foes—notably the growing A2/AD threat. Furthermore, as the *Future Security Environment n*otes, "it is critical that conventional warfighting capabilities not be allowed to deteriorate as such capabilities have proven essential to effectively combat irregular and 'hybrid' adversaries."[69]

Conventional capabilities are also complementary to other expeditionary soft-power-type roles the RCAF is responsible for conducting as part of a WoG effort, such as support to non-combat military operations other than war and PSOs. For instance, RCAF air mobility assets are tasked to move the Disaster Assistance Response Team (DART) globally to assist those suffering from a natural disaster.[70] Furthermore, in their study on peacekeeping, Walter Dorn and Joshua Libben specifically point out that RCAF activities "are quite similar in UN peacekeeping to other operations."[71] Conventional

capabilities are, therefore, essential for operating on the entire spectrum of conflict. The key will, thus, be for the RCAF to find creative ways to utilize its conventional capabilities to maximize AIRPower—agile, integrated, reach and power—effects that meet both domestic requirements (and expectations) and allow Canada to make a meaningful contribution to a coalition.[72] This study offers some suggestions.

LIKELY BREADTH AND FOCUS OF TASKINGS

The breadth of the RCAF's possible expeditionary taskings will be varied and consist of operations along the entire spectrum of conflict. They will likely include (in no particular order):

- supporting a responsibility to protect (RTP)-type UN resolution (i.e., Op MOBILE) (medium to long term);
- reinforcing the NATO deterrent in Eastern Europe vis-à-vis Russia, such as Baltic air policing and deployments to NATO allied territories (i.e., Ops REASSURANCE and IGNITION) [long term in total, though short- or medium-term deployments];
- deploying in response to Russian aggression in Europe in support of Canadian NATO Article 5 commitments (medium term but possibly also long term);
- supporting allies in the event of a NATO Chapter 5 situation (medium to long term);
- supporting UN PSOs (will range from short- to possibly long-term commitments);
- continuing and sustaining ongoing operations (RCAF and joint) such as Op IMPACT (long term);
- supporting humanitarian assistance and disaster relief (HADR)—large scale (i.e., Op DELIVERANCE in Haiti); medium scale (i.e., Op RENAISSANCE in Nepal and Philippines), which will include deployment of DART; and small scale (i.e., deployment of one or two aircraft) for deliveries of food, medicine, etc.;
- supporting non-combatant evacuation operations (i.e., Op PROVISION in Lebanon and Jordan) [short term];
- supporting allies' counter-terrorism operations (i.e., Op SERVAL in Mali [short term] and Op IMPACT [long term]); and
- supporting training and capacity building of host-nation air forces (medium to long term).

It is not anticipated that the government will be favourable towards any kind of long-term campaign that entails robust RCAF kinetic effects (i.e., Afghanistan) unless there is a UN request. Instead, it is more likely that the government will desire micro-engagements.

NOTES

1. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 11; and Canada, DND, *FAOC*, 2. These priorities, in this order, have remained constant in various Canadian Defence White Papers and defence policy statements.

2. Soft power (first articulated by Joseph Nye in 1990) entails co-optive persuasion in international affairs by means of a country's values as well as commercial, ideological and especially cultural influence. It contrasts with "hard power," which entails the use of coercion, usually through economic means or military force (or the threat of it), to induce another state to change its behaviour. Notably, a country can employ its military forces in both hard-power and soft-power roles. See Joseph S. Nye Jr., "Soft Power," *Foreign Policy*, no. 80 (Autumn 1990): 155, 167; and Joseph S. Nye Jr., "Think Again: Soft Power," *Foreign Policy*, February 23, 2006, accessed May 3, 2018, https://foreignpolicy.com/2006/02/23/think-again-soft-power/. For the application of soft power to air power and air forces, see Wing Commander D. S. Glasson, "Hard Decisions for Soft Aerospace Power," Canadian Forces College (CFC) Service Paper, 2012, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/298/286/glasson.pdf.

3. LGen Fred Sutherland, "Technology: A Case Study" (presentation, 2014 RCAF Air Power Symposium, CFC, Toronto, November 5, 2014). Citing an October 2014 Ipsos Reid poll, Sutherland notes that the priorities for CAF according to the Canadian public are (in order): disaster relief in Canadian communities; domestic SAR; patrolling Canadian land, maritime and air space; protecting ocean trade routes; Canada's northern sovereignty; and, lastly, fighting the war on terrorism.

4. United Nations Security Council, Resolution 1973, March 17, 2011, 3, accessed May 3, 2018, https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2011_03/20110927_110311-UNSCR-1973.pdf. See also Margaret H. Woodward and Philip G. Morrison, "The Responsibility to Protect: The Libya Test Case," *Joint Force Quarterly*, no. 71 (4th Quarter 2013): 20–24, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-71/.

5. Colonel Greg Ivey et al., "Reframing Defence: Five Factors Impacting Canadian Defence Policy," CFC Service Paper, June 9, 2016, 4, 19.

6. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 37.

7. See Sanu Kainikara, *Seven Perennial Challenges to Air Forces* (Canberra: Air Power Development Centre, 2009), 41–44, accessed May 3, 2018, http://airpower.airforce.gov.au/Publications/Seven-Perennial-Challenges-to-Air-Forces.

8. The RCAF faced a similar high tempo / fewer resources paradox earlier this century. See Rachel Lea Heide, "Canadian Air Operations in the New World Order," in *Silver Dart Canadian Aerospace Studies*, vol. 2, *Air Campaigns in the New World Order*, ed. Allan D. English (Manitoba: Centre for Defence and Security Studies, University of Manitoba, 2005), 79–80, 84; Canada, DND, A-GA-007-002, *The Aerospace Capability Framework* (Ottawa: Director General Air Force Development, 2003), 45, 49; and Richard Goette and Major Bill March, "Transforming Canada's Post-Cold War Air Force," in *Transformation of Western Airpower*, ed. Gary Schaub Jr. (forthcoming).

9. As mentioned at the outset of this section, these roles are taken from the historical and enduring roles of the Canadian military to defend Canada, defend North America, and contribute to international peace and security. Canada, DND, *FAOC*, 2; and Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 12–13.

10. The exception is a NATO Article 5 situation, which, as the section on Russia shows, is not as far-fetched as it would have been only a few years ago.

11. For instance, a 2013 estimate indicates that Canadian government spending for the military's third priority, contributing to international peace and security, consumed 77 percent of the defence budget, while the first two (i.e., first-principle) priorities, defending Canada and North America, received 14 percent and 9 percent, respectively. Alexander, "Canada's Commitment to NATO," 9. As Canadian political scientists Christian Leuprecht and Joel Sokolsky have noted, Canada usually spends only "just enough" on defence, given the luxury of its defence relationship with the US. Christian Leuprecht and Joel J. Sokolsky, "Defense Policy 'Walmart Style': Canadian Lessons in 'Not-So-Grand' Grand Strategy," *Armed Forces & Society* 41, no. 3 (2014): 544, accessed May 3, 2018, http://journals.sagepub.com/doi/full/10.1177/0095327X14536562.

12. Sanu Kainikara, "The Future Relevance of Smaller Air Forces," Working Paper 29 (Canberra: RAAF Air Power Development Centre, March 1, 2009), 12, accessed May 3, 2018, http://airpower.airforce.gov.au/Publications/Working-Paper-29-The-Future-relevance-of-Smaller-A.

13. LCol Jim Bates, "Interview with Lieutenant General Angus Watt, Canada's Chief of the Air Staff," *Joint Air Power Competence Centre Journal, no. 8 (2008): 37,* accessed May 3, 2018, https://www.japcc.org/portfolio/journal-8/.

14. Canada, DND, ADN 16/01, *Tactical Aviation Mobility, Gloss-1; and DTB record 34907.*

15. Daniel Heidt and Richard Goette, "'This Is No 'Milk Run': An Historical and Contemporary Examination of Operation BOXTOP, 1956–2015," in *Canadian Arctic Operations, 1945–2015: Lessons Learned, Lost, and Relearned, ed. Whitney Lackenbauer and Adam Lajeunesse (Fredericton: The Gregg Centre for War & Society, 2017), 272,* accessed May 3, 2018, http://www.unb.ca/fredericton/arts/centres/gregg/what/publications/CdnArcticOps2017.pdf. Kainikara makes a similar observation regarding the RAAF, noting "Australia's geography and demographic spread is such that even domestic military deployments can be considered expeditionary by any standard." Kainikara, "Future Relevance of Smaller Air Forces," 11.

16. Ivey et al., "Reframing Defence," 13.

17. Canada, DND, *FAOC, note 6. The FAOC's definition is taken from: US, Air-Sea Battle Office, "Air-Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges" (Washington, DC: May 2013), 2. See also Lieutenant Colonel Andreas Schmidt, "Countering Anti-Access / Area Denial: Future Capability Requirements in NATO," Joint Air Competence Centre Journal, no. 23 (2016): 70,* accessed May 3, 2018, https://www.japcc.org/portfolio/journal-23/.

18. This paragraph references Commander Jay Ballard (Retired), "What's Past Is Prologue: Why the Golden Age of Rapid Air Superiority Is at an End," *Joint Air Power Competence Centre Journal, no. 22 (2016): 62–63,* accessed May 3, 2018, https://www.japcc.org/portfolio/journal-22/; Harry Foster, "The Joint Stealth Task Force: An Operational Concept for Air-Sea Battle," *Joint Force Quarterly, no. 72 (1*st Quarter 2014): 47–49, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-72/; US, Air-Sea Battle Office, "Air-Sea Battle," 3; and Mark P. Fitzgerald, "Delivering Air Sea Battle," *Joint Force Quarterly, no. 67 (4*th Quarter 2012): 53–54, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-67/. Quote from Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040, 110.*

19. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040, 111; US, USAF, "*America's Air Force: A Call to the Future" (Washington, DC: Department of the Air Force, July 2014), 16–19, accessed May 3, 2018, http://www.af.mil/Portals/1/documents/SECAF/AF_30_Year_Strategy.pdf; Maj William H. Ballard et al., "Operationalizing Air-Sea Battle in the Pacific," *Air & Space Power Journal 29, no. 1* (January–February 2015): 21, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1153584/volume-29-issue-1-jan-feb-2015/; Schmidt, "Countering Anti-Access / Area Denial," 71, 76; and Gladman, "Future of Allied Air Power: The United States Air Force," 13–15.

20. Ballard, "What's Past Is Prologue," 61; and Canada, DND, *FAOC,* 23. The RCAF's FAOC, in particular, states that to contribute to high-intensity A2/AD coalition effort, "RCAF capabilities will have to be fully integrated and complement the overall coalition capabilities while being able to operate in a contested environment." Canada, DND, *FAOC*, 22.

21. Brad Gladman, "Is the RCAF Ready to Become a Fifth-Generation Enabled Air Force?" *InForm,* no. 12 (October 2015). See also the RCAF's *FAOC*, which notes: "For nations with similar regional interests and an interest in being a valuable coalition partner, finding a meaningful role in such a scenario [i.e., A2/AD] against adversaries equipped with their own next-generation capabilities may prove difficult and expensive. Whatever capabilities are offered to such a coalition must possess an unprecedented degree of interoperability with all US services to avoid being a liability. This in itself will come with significant costs. … Those nations not so equipped [i.e., with advanced technology capabilities] may find themselves less able to influence campaign strategic goals and planning than those who bring leading-edge capabilities." Canada, DND, *FAOC*, 11.

22. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors,* 37; Canada, House of Commons, Standing Committee on National Defence, "Evidence," 2, 8, 11, 15; and "The Royal Canadian Air Force and NATO: In Preparing for Domestic Continental Missions, the RCAF Prepares for NATO Operations – Interview with Lieutenant General Michael J. Hood, Commander, Royal Canadian Air Force," *Joint Air Power Competence Centre Journal*, no. 23 (2016): 21, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-23/. *Canada's Future Security Environment 2013—2040* also outlines the importance—and challenge—of remaining interoperable with the US: "Interoperability with the US will place burdens upon CAF Force Development (FD) to ensure future capabilities the ability to integrate with its armed forces despite the continued development of innovative and technologically advanced military capabilities. Interoperability with the US will remain a primary consideration for CAF FD to facilitate integration with US forces on operations." Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 6. In turn, USAF is desirous that its allies are integrated, as indicated by its priority to "invigorate our commitment to international like-minded Airmen who can build and sustain global partnerships," resulting in a "more capable team of air forces better empowered to provide for their own security, and agile enough to integrate into an effective fighting force." US, USAF, "America's Air Force," 13.

23. Canada, House of Commons, Standing Committee on National Defence, "Evidence," 4.

24. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 36–37; and Gladman, "Is the RCAF Ready." The importance of network connectivity is nicely captured by former Commander RCAF, LGen Hood: "Looking into the future, it's important to imagine a formation of aircraft like a computer network. In a formation in the future, you could have an aircraft over here whose radar can see something, but the optimum weapons deployment is done from a different aircraft in the formation. In the newest types of capability, that's all transparent … . The ability to pass information without giving away your position is very important. How discreetly and securely it passes information is key moving forward. All the new systems that are coming in place, whether they're AWACS [airborne warning and control system], space-based, or radio, are working in that environment. We need to make sure that whatever we get is able to do that now, but also out into the future. That will be key." Canada, House of Commons, Standing Committee on National Defence, "Evidence," 15. See also Lieutenant General David A. Deptula (Retired), "Evolving Technologies in the 21st Century: Introducing the 'Combat Cloud,'" Mitchell Institute Policy Papers, no. 4 (September 2016), accessed May 3, 2018, http://docs.wixstatic.com/ugd/a2dd91_73faf7274e9c4e4ca605004dc6628a88.pdf.

25. Robbin Laird, "Higher Tempo Ops in Contested Airspace: Trilateral Airpower Exercise," *Frontline Defence* 13, no. 1 (2016): 22, accessed May 3, 2018, http://defence.frontline.online/article/2016/1/4063-Higher-Tempo-Ops-in-Contested-Airspace.

26. Robbin Laird, "Airpower and the Hybrid Threat," *Frontline Defence,* 12, no. 6 (2015): 34–35, accessed May 3, 2018, http://defence.frontline.online/article/2015/6/3711-Airpower-%26-the-Hybrid-

Threat. The importance of integrating as a networked system is also borne out by LGen Hood: "As newer platforms come on, the capability of the equipment we have to be seamlessly interoperable in an environment where you need to be very discreet with signals passage … . This is technology. How they detect our aircraft are there is quite often … by how we pass information between aircraft and platforms. That capability is becoming more and more complex, and the majority of our allies are in the process right now of fielding advanced aircraft. We will continue to have problems with our present F-18 fleet in being seamlessly interoperable." Canada, House of Commons, Standing Committee on National Defence, "Evidence," 8.

27. Australia, RAAF, "Plan Jericho" (Canberra: Department of Defence, 2015), accessed May 3, 2018, http://airpower.airforce.gov.au/Publications/Plan-Jericho. As Brad Gladman has noted, "the Australians have invested heavily in defence, something brought about by their dynamic region and need to demonstrate to the US their reliability as an essential ally and capable military partner." Brad W. Gladman, "The Future of Allied Air Power: The Royal Australian Air Force," DRDC Scientific Report DRDC-RDDC-2015-R212 (Trenton, ON: CFAWC and DRDC Centre for Operational Research Analysis, October 2015), 13, accessed May 3, 2018, http://pubs.drdc-rddc.gc.ca/BASIS/pcandid/www/engpub/DDW?W%3DSYSNUM=802709&r=0.

28. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors,* 28–29; Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 3rd ed. (Trenton, ON: CFAWC, November 2016), 32–33, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/aerospace-doctrine.page; and LCol Brian L. Murray, "What Air Forces Do," *Canadian Air Force Journal* 4, no. 4 (Fall 2011): 40–41, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/archives.page. Indeed, this has been an enduring aspect of Canadian air force culture. See also Dr. Richard Goette, "A Snapshot of Early Cold War RCAF Writing on Canadian Air Power and Doctrine," *Royal Canadian Air Force Journal* 1, no. 1 (Winter 2012): 50–61, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/archives.page.

29. Kainikara, "Future Relevance of Smaller Air Forces," 7; Laird, "Higher Tempo Ops," 22–23; Dr. Dolf H. W. Bos, "Back to the Future! Future Air Power Ambition in an Austere Economic Climate," *Joint Air Power Competence Centre Journal*, no. 17 (2013): 71, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-17/; and Philip Sabin, "Air Power's Second Century: Growing Dominance or Faded Glory?," *Joint Air Power Competence Centre Journal*, no. 15 (2012): 59, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-15/.

30. Lieutenant Colonel Martin Menzel, "China's Aerospace Power 2015: Reconnaissance-Strike Capabilities for an Anti-Access / Area-Denial Strategy," *Joint Air Power Competence Centre Journal*, no. 21 (2015): 27, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-21/. See also Ballard, "What's Past Is Prologue," 56–64.

31. RAAF air power academic Sanu Kainikara's words are instructive: "The assured protection from air interference in surface operations, provided by their superior friendly air forces, has now not only been taken for granted, but in a dubious manner is sometimes twisted around to make the very same force providing this security irrelevant." Kainikara, "Future Relevance of Smaller Air Forces," 7.

32. Canada, DND, *FAOC*, 22. This issue of operating in a degraded environment was, in fact, addressed at the "Joint Air & Space Power Conference, 2016: Preparing NATO for Joint Air Operations in a Degraded Environment," Joint Air Power Competence Centre, accessed May 3, 2018, https://www.japcc.org/portfolio/conference-proceedings-2016/.

33. It should be noted that man-portable air defence systems (MANPADSs) have been a constant threat in recent campaigns, especially to low-flying aircraft and helicopters and will remain so into the future. For instance, RCAF CF188s were required to operate at relatively high altitudes during OUP due to the MANPADS threat. Mayne, "Canadian Experience," 252; Ballard, "What's Past Is Prologue," 59;

Maj Cosmin Gabriel Vlad, "Looking at Our Past: SEAD Factors of Influence," *Joint Air Power Competence Centre Journal*, no. 16 (2012): 29–33, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-16/; Col Frans Osinga, "Air Power for Expeditionary Operations: Meeting the Challenge?" *Joint Air Power Competence Centre Journal*, no. 6 (2007): 33, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-6/; and Maj Sebastian Maślanka, "The Threat Still Exists – Suppression of Enemy Air Defences," *Joint Air Power Competence Journal*, no. 14 (2011): 21–24, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-14/. The RCAF does not currently maintain a SEAD capability, though it could if Canada procures the F-35 or the F-18G as part of its Future Fighter Capability project. Email from RCAF officer, September 4, 2016. Air forces that currently or will soon employ a SEAD capability are USAF, United States Navy (USN), RAF, Luftwaffe and RAAF. Christian F. Anrig, "Allied Air Power over Libya," in *Air Power in UN Operations: Wings for Peace*, ed. A. Walter Dorn (Surrey: Ashgate Publishing Limited, 2014), 260–61, accessed May 3, 2018, http://unairpower.net/chapter-15-allied-air-power-over-libya/; and Squadron Leader I. Smith, "Australian EA-18G Growler: Strategic Asset or Expensive Toy?" (Solo Fight paper, CFC, 2016), 9, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/318/305/smith.pdf.

34. LGen Chris Coates, Deputy Commander Continental CJOC, "Joint Perspective of Technology" (presentation, 2014 RCAF Air Power Symposium, CFC, Toronto, November 5, 2014); Canada, DND, *FAOC, 22; and Gladman, "Is the RCAF Ready."*

35. Mayne, "Canadian Experience," 256; Bos, "Back to the Future!," 71; and Vlad, "Looking at Our Past," 32.

36. As Lieutenant Colonel Harald Høiback of the Norwegian Air Force notes, "the Western world has become so dominant in the air that it is hard to see why we should have a single worry in the world, concerning Air Power." Lieutenant Colonel Harald Høiback, "Too Good for Comfort? Air Power's Battle Against Rising Expectations," *Joint Air Power Competence Centre Journal*, no. 16 (2012): 45, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-16/; Schmidt, "Countering Anti-Access / Area Denial," 74. On the issue of rising expectations of air power, see Schmidt, "Countering Anti-Access / Area Denial"; Ballard, "What's Past Is Prologue"; Anrig, "Allied Air Power over Libya," 279–81; Osinga, "Air Power for Expeditionary Operations," 32; Bos, "Back to the Future!," 68–72; and Sabin, "Air Power's Second Century," 55–61. Indeed, noted strategic-studies author Martin van Creveld has questioned the utility of air power, arguing that it has been in decline since the end of the Second World War. Martin van Creveld, *The Age of Airpower* (New York: Public Affairs, 2011).

37. On this subject, see Kainikara, *Seven Perennial Challenges*, 51–52, 55–56.

38. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 11.

39. Col Bertil van Geel, "Royal Netherlands Air Force: From the Past to the Future" (presentation, "The Transformation of European Airpower: Lessons for the Royal Danish Air Force" conference, Centre for Military Studies, The Kastellet, Copenhagen, Denmark, November 12–13, 2014).

40. The RCAF, of course, has taken part in these efforts. See Canada, DND, "Operation REASSURANCE," accessed May 3, 2018, http://www.forces.gc.ca/en/operations-abroad/nato-ee.page; and Canada, DND, "Operation IGNITION," accessed May 3, 2018, http://www.forces.gc.ca/en/operations-abroad-past/op-ignition.page. Due to weaknesses in land forces compared to Russian capabilities, air power, in particular, has been identified as the pivotal means by which NATO would be able to overcome any conventional Russian aggression in the region. See Michael Kofman, "The Expensive Pretzel Logic of Deterring Russia by Denial," *War on the Rocks*, June 23, 2016, accessed May 3, 2018, www.warontherocks.com/2016/06/the-expensive-pretzel-logic-of-deterring-russia-by-denial/.

41. This paragraph references Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 12; Ballard, "What's Past Is Prologue," 63; Christopher J. Lamb and Susan Stipanovich,

"Back to Basics on Hybrid Warfare in Europe: A Lesson from the Balkans," *Joint Force Quarterly*, no. 81 (2nd Quarter 2016): 92–93, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-81/; and Michael Kofman and Matthew Rojansky, "A Closer Look at Russia's 'Hybrid War,'" *Kennan Cable*, no. 7 (April 2015), accessed May 3, 2018, https://www.wilsoncenter.org/publication/kennan-cable-no7-closer-look-russias-hybrid-war.

42. As one study on the growing Russian maritime threat put it, "just as air chiefs fight the perception NATO will always have air superiority in any campaign, maritime leaders must also engage to challenge the perception that NATO's maritime forces will always have maritime superiority." NATO, JAPCC, *Alliance Airborne Anti-Submarine Warfare: A Forecast for Maritime Air ASW in the Future Operational Environment,* White Paper (Kalkar, Germany: JAPCC, June 2016), 1, accessed May 3, 2018, https://www.japcc.org/portfolio/alliance-airborne-anti-submarine-warfare/.

43. Mathew Bodner, "Russia's Polar Pivot," *Defense News*, March 11, 2015, accessed May 3, 2018, https://www.defensenews.com/home/2015/03/11/russia-s-polar-pivot/; Murray Brewster, "Russia Launches Large-Scale Military Manoeuvres in the Arctic," CTV News, March 16, 2015, accessed May 3, 2018, http://www.ctvnews.ca/world/russia-launches-large-scale-military-manoeuvres-in-the-arctic-1.2281388; "Russia to Set Up Arctic Military Command by 2015," Sputnik International, February 17, 2014, accessed May 3, 2018, http://en.ria.ru/russia/20140217/187620827/Russia-to-Set-Up-Arctic-Military-Command-by-2015.html; Bill Gertz, "Russian Strategic Bombers Near Canada Practice Cruise Missile Strikes on US," *Washington Free Beacon*, September 8, 2014, accessed May 3, 2018, http://freebeacon.com/national-security/russian-strategic-bombers-near-canada-practice-cruise-missile-strikes-on-us/; and "Moscow to Station MiG-31s and Su-34S at latest Far North Arctic Base," Aerogram, April 25, 2016.

44. LGen Chris Coates, "The Continental Perspective" (speaking notes, Air Power Symposium 2016, 31 March – 1 April 2016, 4–5), accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/air-power-symposium/2016.asp; Canada, House of Commons, Standing Committee on National Defence, *Canada and the Defence of North America*, 61; and "Standing on Guard for Thee," *Skies Magazine*, January 2, 2015, accessed May 3, 2018, https://www.skiesmag.com/press-releases/standingonguardforthee/.

45. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 12; and Piotr Butowski, "Russian Airpower Almanac 2015," *Air Force Magazine* 98, no. 7 (July 2015): 48. On the popularity in Russia of Putin's aggressiveness, see Steven Lee Myers, *The New Tsar: The Rise and Reign of Vladimir Putin* (New York: Alfred A. Knopf, 2015).

46. Butowski, "Russian Airpower Almanac 2015," 48–71; Ballard, "What's Past Is Prologue"; and Schmidt, "Countering Anti-Access / Area Denial," 72. For an interesting account of how Russia views NATO's air power capabilities on its periphery, see Lieutenant Colonel Thomas R. McCabe (Retired), "The Russian Perception of the NATO Aerospace Threat: Could It Lead to Preemption?," *Air & Space Power Journal* 30, no. 3 (Fall 2016): 65–77, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1151200/volume-30-issue-3-fall-2016/.

47. Bill Gertz, "Northcom: Russian Cruise Missile Threat to U.S. Grows," *Washington Free Beacon,* March 20, 2015; Laird, "Higher Tempo Ops," 22; and Canada, House of Commons, Standing Committee on National Defence, "Evidence," 3.

48. Hybrid warfare is defined as "the blending of conventional and irregular (or asymmetric) approaches to warfare. State and non-state actors alike will seek to combine conventional, irregular and high-end asymmetric methods concurrently, often in the same time and space through the land, air, sea, space environments and the cyber domain. These approaches may challenge the conventional understanding and adaptability to irregular and regular military activity. Adversaries applying hybrid techniques might use a unique combination of capabilities that are specifically designed to target our vulnerabilities. Such adversaries

may possess the ability to forestall a military decision in a conflict sufficiently long that it undermines the political-strategic goals of Western coalition members. The overarching implication is that Western militaries must train to balance traditional manoeuvre warfare capabilities with training suitable for addressing the challenges on the lower end of the spectrum of conflict." Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 93–94.

49. On the lack of precision of Russian airstrikes in Syria, see Margarita Antidze and Jack Stubbs, "Before Syria, Russia Struggled to Land Air Strikes on Target," *Reuters World News*, October 26, 2015, accessed May 3, 2018, http://www.reuters.com/article/us-mideast-crisis-syria-russia-bombing-idUSKCN0SK1WF20151026.

50. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 12.

51. Canada, DND, *FAOC*, 18.

52. Frederic Wehrey, "The Libyan Experience," in Mueller, *Precision and Purpose*, 46.

53. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 9.

54. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 8–10; Maj F. G. Rock, "Levelling the Playing Field: An Analysis of the Essential Elements of a Contemporary Counter-Asymmetric Strategy" (Master of Defence Studies, CFC, 2015), Chapter 2, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/317/286/rock.pdf; Gladman, "Future of Allied Air Power: The United States Air Force," 18, 31–36; Michael P. Flaherty, "Red Wings Ascendant: The Chinese Air Force Contribution to Antiaccess," *Joint Force Quarterly*, no. 60 (1st Quarter 2011): 95–101, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/; and Menzel, "China's Aerospace Power 2015," 22–27.

55. Tsuyoshi Kawasaki, "Where Does Canada Fit in the US–China Strategic Competition Across the Pacific?," *International Journal* 71, no. 2 (2016): 218–22, accessed May 3, 2018, http://journals.sagepub.com/doi/full/10.1177/0020702016643344; Flaherty, "Red Wings Ascendant," 97–98; and Gladman, "Future of Allied Air Power: The United States Air Force," 18, 24. See also Rock, "Levelling the Playing Field," Chapter 1.

56. Flaherty, "Red Wings Ascendant," 100; and Menzel, "China's Aerospace Power 2015," 27. Quote from US, Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2013* (Washington, 2013), i, as cited in Canada, DND, A-FD-005-001/AF-003, Future Security Environment 2013–2040, 9.

57. Fitzgerald, "Delivering Air Sea Battle," 53–54; Gladman, "Future of Allied Air Power: The United States Air Force," 25–30; Flaherty, "Red Wings Ascendant," 99–100; Ballard, "What's Past Is Prologue," 61; Gladman, "Is the RCAF Ready"; Ballard et al., "Operationalizing Air-Sea Battle," 21; and Menzel, "China's Aerospace Power 2015," 23–26. For an excellent overview of Chinese A2/AD capabilities see Andrew F. Krepinevich, *Why AirSea Battle?* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), 13–25; and Michael S. Tucker and Robert W. Lyons, "Silent Watch: The Role of Army Air and Missile Defence," *Joint Force Quarterly*, no. 73 *(2*nd Quarter 2014): 96, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-73/.

58. US, Department of Defense, *Joint Operational Access Concept (JOAC)* (Washington: Department of Defense, January 17, 2012), accessed May 3, 2018, https://www.defense.gov/Portals/1/Documents/pubs/JOAC_Jan%202012_Signed.pdf; Krepinevich, *Why AirSea Battle?*, 5–25; Jan van Tol, *AirSea Battle: A Point-of-Departure Operational Concept* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), accessed May 3, 2018, https://csbaonline.org/research/publications/airsea-battle-concept; US, Air-Sea Battle Office, "Air-Sea Battle," 4–7; Tucker and Lyons, "Silent Watch," 95–96; Andrew Krepinevich, "Technology and Alliance Implications of Air-Sea Battle (Archipelagic Defence)" (keynote address, 2014 RCAF Air Power Symposium,

CFC, Toronto, November 5, 2014); Kawasaki, "Where Does Canada Fit," 219–20; and Michael E. Hutchens et al., "Joint Concept for Access and Maneuver in the Global Commons: A New Joint Operational Concept," *Joint Force Quarterly*, no. 84 (1st Quarter 2017): 134–40, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-84/. For an excellent overview see Gladman, "Future of Allied Air Power: The United States Air Force," 18, 22–30; and Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 12–13.

59. US, Air-Sea Battle Office, "Air-Sea Battle," 3–8; Fitzgerald, "Delivering Air Sea Battle," 53–54; and Ballard et al., "Operationalizing Air-Sea Battle," 23–41.

60. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 10; and Gladman, "Future of Allied Air Power: The United States Air Force," 30, 32. For instance, Iran is an importer of Chinese military systems.

61. Col Tom Torkelson et al., "Strategic Flexibility to Deter in the Asia-Pacific," *Air & Space Power Journal* 30, no. 3 (Fall 2016): 23–38, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1151200/volume-30-issue-3-fall-2016/.

62. Ballard et al., "Operationalizing Air-Sea Battle," 41.

63. Kawasaki, "Where Does Canada Fit," 224–25, 228–29. On the RCAF's contribution to RIMPAC, see Col David Lowthian, "CFACC and CAOC Observations and Recommendations from RIMPAC 2014," *Royal Canadian Air Force Journal* 4, no. 1 (Winter 2015), accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2015-vol4-iss1-winter.page.

64. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 11.

65. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 19.

66. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*; Rock, "Levelling the Playing Field," Chapter 2; and Schmidt, "Countering Anti-Access / Area Denial," 73. Quote from Gladman, "Future of Allied Air Power: The United States Air Force," 18. For an excellent overview of Iranian A2/AD capabilities, see Gladman, "Future of Allied Air Power: The United States Air Force," 31–36; and Krepinevich, *Why AirSea Battle?*, 27–36.

67. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 19; and Gladman, "Future of Allied Air Power: The United States Air Force," 31–36.

68. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 3; and Ivey et al., "Reframing Defence," 3–4, 11.

69. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 95. See also Wing Commander Dave Glasson, "'Big War' Air Power for 'Small War' Operations," *Royal Canadian Air Force Journal* 3, no. 1 (Winter 2014), accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss1-winter.page; and Bos, "Back to the Future!"

70. Canada, DND, *FAOC*, 22. On the RCAF's role in supporting DART, see LCol C. K. Bramma, "Directing the DART Towards Climate Change" (Master of Defence Studies, CFC, 2015), accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/317/286/bramma.pdf.

71. A. Walter Dorn and Joshua Libben, "Unprepared for Peace? The Decline of Canadian Peacekeeping Training (and What to Do About It)" (Ottawa: Canadian Centre for Policy Alternatives and Rideau Institute on International Affairs, February 2016), 6, accessed May 3, 2018, https://www.policyalternatives.ca/publications/reports/unprepared-peace.

72. Canada, DND, *FAOC*, 3.

3
Why Niches (and Why Not)?

The primary responsibility of all competent air forces … [is] to provide the government of the day with first-rate air power.[1]

– Dr. Sanu Kainikara, RAAF Air Power Development Centre

NICHE VERSUS BALANCED AIR FORCE

Before outlining possible RCAF niches, it is important to engage in a discussion of a niche capability versus a holistic/balanced spectrum-of-capabilities approach to determine the strengths and weaknesses of each. Kainikara provides an instructive categorization of air forces with insights on a niche approach. Based on an air force's "air power capability-spread,"[2] he breaks air forces into four main categories (based partially on size but especially based on depth, range of capabilities and industrial capability) and then rates them on a scale of self-sufficiency and operational capability. As the strongest air force in the world, USAF merits a category of its own due to its possession of high levels of Kainikara's criteria. The next category is large air forces, which consists of a balanced force of air power capability, adequate resident depth and a modest degree of industrial capabilities. Smaller air forces follow: they are still balanced forces but have limited depth and limited or no industrial capability. The last category is niche air forces, which only have niche capabilities, no depth and no industrial capabilities.[3]

SMALLER AIR FORCES

The RCAF falls into the smaller category[4] (though it has been described as a "smedium" air force[5]), and the implications of this classification merit greater discussion. For one, it is important to note that the RCAF does not qualify as a large air force, which Kainikara defines as possessing "the entire spread of air power capabilities in sufficient quantity and with adequate redundancy to conduct major, long-drawn campaigns independently without having to avail themselves of assistance from allies."[6] Smaller air forces, like the RCAF, are still balanced air forces, in that they possess the capabilities (i.e., systems, pro-

cesses and inherent capacity) to deliver the full spectrum of air power functions and conduct operations independently, but have limited depth in the ability to sustain their capacities.[7] Kainikara gives a positive portrayal of smaller air forces, noting specifically that they "make very capable allies and coalition partners and can bring significant capabilities to bear under the umbrella of a large air-force-led coalition."[8]

However, this does not mean that the *demands* on smaller air forces are also small. As Kainikara notes, there are significant challenges placed on smaller air forces to carry out their air power roles on behalf of their government:

> The demands on smaller air forces are the same as large air forces and require that they be able to project military power independently or as part of joint, coalition and combined teams, while simultaneously conducting peacekeeping and humanitarian assistance operations as part of interagency security initiatives. Even for large air forces this is a difficult task at best and requires very careful husbanding of scarce resources at the highest strategic level. In the case of smaller air forces, the appropriately prioritised allocation of resources and capability assets is critical at all times and assumes the greatest importance when involved in concurrent operations.[9]

Also true for large air forces, but especially smaller air forces, is that innovations in air power technology and resultant improvements in air power capability are resource intensive and, thus, are extremely challenging—especially as they relate to cost and personnel requirements. Put differently, advances in modern air power that USAF, in particular, is able to afford and incorporate make it extremely difficult for others to keep pace with the Joneses, resulting in a growing capability gap between USAF and other Western air forces. Although smaller air forces have been able to maintain a balance of capabilities, this 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. Kainikara observes that this is something that many air forces—and arguably the RCAF is one of them—are struggling with: "today, the world's air forces are grappling with the increased cost of fielding even a baseline level of air power capability; not always with complete success."[10]

NICHE AIR FORCES

This has led some to consider adopting a niche-air-force approach. The problem with niche air forces is that they occupy the bottom rung of Kanikara's self-sufficiency / operational capacity model. Such air forces "do not have the full spread of air power capabilities and are able to carry out only a few dedicated roles and/or functions in limited quantum."[11] Kainikara's depiction of niche air forces has an obvious negative stigma in terms of capability, effectiveness and value. He remarks:

> Niche air forces possess only restricted numbers of systems because of their lack of resource capacity to acquire and maintain larger numbers of sophisticated

> airborne systems.In addition, nations with such air forces will be almost completely dependent on external sources—for industrial development, operational support and infrastructure—needed for the optimal employment of their air power capabilities. Obviously a niche air force will also be of limited importance in the highest level strategic appreciation of national security requirements.[12]

Such views are also consistent with *Air Force Vectors*. It defines niche air forces as "air forces that maintain specific capabilities for very specific purposes. They have little or no flexibility to respond to events across the spectrum of conflict."[13] Indeed, *Air Force Vectors* places niche air forces on the bottom rung (even below constabulary air forces) in terms of an air force's breadth of air power capabilities.[14]

Kainikara provides additional disadvantages of niche air forces. In particular, he argues "that air forces must be balanced forces with all core air power capabilities resident in them."[15] Such balance is necessary for an air force to achieve the level of "evolutionary sequence" of being able to influence a joint campaign and the achievement of the end state in an armed conflict from a military perspective. "In contrast," he continues, "a niche air force—a force with only selected core capabilities resident in it—will, at best, be able to achieve full technical mastery and in some instances also be able to function at the level of having professional mastery of the single service domain."[16] Kainikara's clear implication is that if the RCAF were to adopt a niche approach (vice maintaining its current smaller-air-force balanced-force construct), it would mean that its self-sufficiency, operational capacity and, therefore, value as a coalition partner in expeditionary operations would all decline.

NICHE DISADVANTAGES

Careful consideration, therefore, needs to be given regarding whether the RCAF wants to abandon its current balanced smaller-air-force status and undertake a niche approach, lest it be categorized as a niche air force according to Kainikara's model. This is especially challenging for the RCAF, given its unique characteristics as a professional air power institution. The formation of Air Command in 1975, when all air power in Canada was centralized under the ownership and command of the air force, has resulted in a wide breadth of both air power functions and responsibilities. Added to this are the huge geographical vastness of Canada as well as the resulting significant domestic, continental and overseas commitments that the RCAF must undertake.[17] Indeed, it could be argued that these factors would demand a balanced force vice niche approach for the RCAF if it were to carry out its professional responsibility for providing Canadian air power.[18]

There are a number of other disadvantages of niches. Although air power academic Christian Anrig is an advocate of European countries adopting air-force niches, he

observes that there is a perception that a niche approach limits national freedom of action, as "nations are reluctant to become reliant on other allies for particular capabilities."[19] This is a key concern for the RCAF. A related drawback of a niche approach is that the RCAF would not be able to contribute to a coalition operation if its niche capability or expertise is not needed, thereby limiting the government's options to contribute to international peace and security and, thus, reducing the utility of the RCAF itself.[20] Lacking certain capabilities may limit a country's participation in another way, as "states may be politically reluctant to participate in the coalition unless the benefit clearly outweighs the cost and risk."[21]

Another disadvantage of niches is that the quality-versus-quantity debate upon which it is partially based is no longer completely valid. Although Anrig notes that "size has not much mattered in generating European air power,"[22] recent developments—notably related to the Russian and Chinese A2/AD challenge—have challenged this view. Whereas previously having the best kit was a force multiplier (in that the best technology would allow one to counter larger numbers of an adversary's less technologically advanced capabilities), this is not necessarily still the case. There is concern in the fighter community, for instance, that potential adversaries could saturate the modern air campaign with larger numbers of aircraft.[23] For niches, this means that focusing expertise and specialization in a certain area to maximize the quality of a contribution, therefore resulting in smaller numbers of a high-quality capability, may be detrimental if the operational situation requires large numbers of friendly forces to counter an adversary's mass of capabilities.[24]

NICHE ADVANTAGES

There are also some advantages to niches that the RCAF may want to consider. Niches may help countries rationalize where to focus their efforts if they do not have the wide spectrum of air power capabilities like the US. As Richard Mayne has noted, "smaller NATO nations such as Canada do not have the same resources as their larger allies, and often have to struggle to find the right balance of equipment, training, personnel, and doctrine that will allow them to provide the readiness, agility, flexibility, and versatility required to respond to unforeseen situations."[25] Niches would possibly free the RCAF from having to stretch its resources to find this balance. Burden-sharing is another consideration.

The US is Canada's key ally and coalition expeditionary partner. As the world's remaining superpower, the US has maintained large, balanced capabilities to operate across the spectrum of conflict—capabilities upon which a number of US coalitions rely.[26] Although these capabilities will remain, the US's employment of them will be more restrained due to the rise of regional powers and related fiscal restraints. The US will (and OUP is a good example) call on other countries, such as Canada, to make greater contributions to coalition operations. Advocates of a niche approach cite this burden-sharing issue as a reason for countries to focus on particular areas of capability specialty to fill a void in a coalition in the absence of the US.[27] Moreover, if the Americans stay engaged on a large scale in a coalition endeavour, advocates of a niche approach argue that development of

a specialized capability that is compatible with the US will ensure greater interoperability with the world's superpower and, therefore, will potentially offer the opportunity to play a key and/or disproportionate role.[28]

Indeed, niche-air-force advocates stress that a niche approach can allow a country to make a disproportionate contribution to coalition expeditionary operations and permit it to "punch above its weight" in terms of maximizing strategic effects, international prestige and an enhanced sense of accomplishment.[29] This is certainly the case of Swiss air power academic Anrig, who has called upon European countries to adopt a niche-capability role. Citing limited resources and the resulting inability of European air forces to afford acquiring the full spectrum of air power, Anrig argues that there is a "transatlantic air power capability gap."[30] His writing on European air-force capability niches offers some interesting insights for the RCAF if it is to adopt a niche approach. The challenge for smaller European nations, according to Anrig, is "what particular capabilities they should provide, in order to contribute to a sensible force mix on a supranational level."[31] Citing a post–Cold War movement towards air forces conducting "real operations" instead of previous deterrence postures, he highlights the four air power roles of control of the air, mobility and lift, intelligence and situational awareness as well as attack (kinetic and non-kinetic). In particular, Anrig observes that "in the current environment of deployed operations, a fully autonomous force must be able to meet all these roles. Yet achieving full effectiveness in all areas is, and will almost certainly remain, beyond the affordable reach of a single European nation."[32] Indeed, the phrase "a single European nation" could be replaced with "Canada," as the RCAF faces similar challenges.

In advocating niche capabilities, Anrig calls for smaller European countries to adopt role specialization.[33] Countries that develop niche expertise in certain areas or roles would result in a "sought-after niche capability," which, he argues, would permit the country greater leverage in a coalition or an alliance.[34] The specific air power niches he recommends countries focus on include "airborne early warning, wide area air-to-ground surveillance, stand-off jamming, suppression of enemy air defences, theatre ballistic missile defence, high-altitude long-endurance unmanned aerial vehicles, deployable air operations centres, combat search and rescue, air-to-air refuelling, strategic airlift, and deployable airbases."[35] Not only can such niches permit a country's air force to plug and play in a coalition, Anrig argues, but they can also supplement the capabilities of larger, more balanced air forces, "and thereby contribute to more robust and sustainable force packages."[36] Moreover, a combination of countries with smaller niche air forces could also complement each other and enable more sustained operations (i.e., the collective advantage of the sum of the parts).

ALLIANCE VERSUS NATIONAL NEEDS

Anrig's advocacy of European air-force niches is consistent with other calls, at the turn of the century, for NATO countries to adopt niche capabilities (i.e., general niches,

including air force) because it would, the logic goes, strengthen the alliance as a whole. This is best captured by Colonel (Col) D. W. Read:

> NATO should not insist that individual members' military capabilities be multi-functional across a broad range of mission areas. Instead, the Alliance should concede that its capabilities must be mission specific, with a wide range of nations each providing a particular contribution. This "niche capability" concept demands that the forces of all Alliance members—high- or low-tech—must be integrated into a harmonious architecture structured on a matrix of complementary and supplementary capabilities.[37]

In advocating this approach, Read outlined eight principles upon which a niche-capability strategy should be based: embrace a tiered structure, establish core competencies, exchange technology, redistribute NATO common funds, invest in research and development, integrate the European defence industry, integrate capitalization plans and work on a list of objectives.[38]

Although some of these principles would be relevant to an RCAF niche approach, others are not. For instance, Read's observation that "in some cases, there will have to be a willingness to give up on some national capabilities in order to restructure for the common good"[39] is inconsistent with the RCAF's first-principle requirement to safeguard Canada. In addition, although there is great merit to technology exchange to "ensuring that the Alliance can 'plug and play' into the American information, technological and doctrinal architecture,"[40] this has to be balanced with the concern for "data sovereignty" in the security and defence environment of today's information age.[41] Other authors have written about the advantages of niches.

In one paper, Major (Maj) K. C. Rubner cites financial strains on the current CAF force structure as a reason for Canada—and by extension the RCAF—to adopt a niche approach.[42] The effort to provide capability for full-spectrum operations is unrealistic, given the current lack of funding for CAF. Echoing Anrig, Rubner notes that niches offer CAF the opportunity to plug into coalition operations by performing particular specialized roles. Tailoring capabilities through a niche approach would allow CAF to contribute essential force components, which could permit Canada "to make meaningful and valued contributions to coalitions beyond its borders."[43] In today's fiscal environment, Rubner argues, attempting to provide a balanced force with a little bit of everything risks putting the RCAF in a jack-of-all-trades-and-master-of-none type of situation. Focusing funding on niche capabilities to develop expertise within particular capabilities, therefore, promises "the potential to produce significant cost savings as well as ensure robust investment profiles to sustain high levels of specialization over the long term."[44]

Fiscal restraints and the desire to make a meaningful contribution to alliances are also the hallmark of Maj Frank Costello's advocacy of an RCAF niche capability. Writing in early 2001 (i.e., before 9/11), he remarked that "to remain relevant to Canada and the

Canadian people, the CF [Canadian Forces] needs to reject the unrealistic expectation of maintaining a multi-purpose, multi-role air force and pursue the development of a niche capability, one that will also be more applicable to the needs of alliance partners."[45] His recommendation was for Canada's air force to focus on an air mobility niche. To accomplish this, Costello proposed a radical fleet rationalization solution that called for the air force divesting itself entirely of its fighter capability and transferring tactical aviation and maritime air assets to the army and navy, respectively. Such was the decrepit state of the Canadian air force's CF188 Hornet fleet at the time that an air mobility niche, Costello argued, would meet a particular deficiency and, thus, "promises deliverance from marginalization and irrelevance through the possession of a legitimate capability."[46] Costello's paper is an example of an extreme niche-capability solution, in that it would have greatly limited RCAF air power at the expense of one focused capability. This example embodies all of the negative aspects of the niche-air-force categorization that Kainikara and *Air Force Vectors* outline.

CANADA AND A NICHE APPROACH

A niche focus could also embody a military "functional" approach to the RCAF's participation in coalition endeavours. Focus on particular capabilities—especially the ability to plug into coalition constructs to perform an essential and important niche role—can allow the RCAF to have a "seat at the console."[47] Arguably being even more important than the larger concept of "a seat at the table," having a seat at the console would allow the RCAF at the operational level to work hand-in-hand with its allies to make a disproportionate contribution to the coalition mission. There are numerous examples of the Canadian military being able to functionally plug into larger American networks and formations: the navy's ability to plug into United States Navy (USN) carrier task forces;[48] RCAF CF188s' success in plugging into USN air operations during the 1991 Gulf War;[49] and, of course, the close integration of CAF personnel into NORAD (including the fact, that since 1957, the all-important J3 Operations position has always been allocated to an RCAF major-general-equivalent rank[50]) all come to mind. A niche-capability functional approach need not be completely focused on interoperability with the US. Though such interoperability with Canada's southern neighbour is definitely desirable, given the recent American policy of trying to divest itself of providing the leadership and the majority of resources to coalition operations as well as to have other nations step up to the plate to fill this void (again, the OUP example is a good one[51]). This factor suggests that the RCAF also focuses on greater interoperability with other Five Eyes and NATO partners.[52]

It could also be argued that there is a historical precedent of the RCAF providing niche capabilities. Following the Second World War, the growing size and expense of Cold War heavy bombers and Canada's early decision not to possess nuclear weapons led Canadian airmen to abandon strategic bombing and concentrate, instead, on the niche capability of

air superiority with a resulting fighters-first focus. The RCAF—and Canada by extension—was able to parlay this into both strategic and operational influence (and prestige) in both NATO and the growing bilateral continental air defence relationship with the US (embodied by NORAD after 1957).[53]

Lastly, a niche approach may also offer advantages for Canada's aerospace industry. A niche capability may require particular aircraft, systems or support services that Canadian industry can provide, thereby resulting in regional benefits for the industries themselves, workers and politicians. Moreover, as Rubner has noted, CAF—and by extension the RCAF—"would benefit from consistent and readily available capability without needing to engage in procurement from foreign sources."[54]

THE WAY AHEAD

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. Accordingly, this study explores a variety of options for RCAF niches. In doing so, however, it is not limited to a restrictive conceptualization of "niche." Although specific platforms can be identified as niche capabilities—and indeed some will be examined—this study goes beyond aircraft by utilizing creative, outside-the-box thinking. For one, it explores RCAF niches in terms of the potential effects they can produce.[55] This study also examines RCAF niches in the context of developing the depth of air power capabilities identified in Kainikara's model. This study recognizes that fiscal and other restraints, especially those on personnel,[56] mean that the RCAF will not be able to adopt all of the potential niches available to it. Nevertheless, a variety of possibilities are presented so that the RCAF has a menu of possible options to choose from and can weigh each option's advantages and disadvantages if it decides to adopt a niche approach. Even if the RCAF decides not to pursue a niche approach, this study offers ways to enhance existing RCAF capabilities to improve and augment the smaller-air-force balanced-force construct.

In examining niches, this study does not consider the option of pooling and sharing capabilities that some European countries have adopted in recent years as part of the NATO "Smart Defence" concept of encouraging synergies through economies of scale.[57] Canada has not based its forces overseas in Europe in over 20 years now, and so the geographical distance between RCAF home bases and those of its European NATO partners makes this option unfeasible. Moreover, the sovereignty implications of pooling and sharing are such that it is highly likely that the Canadian government would not favour such an approach.[58] This study does, however, examine possible niches based on the policy and direction guidance of the government in an attempt to ensure RCAF adherence to government defence priorities. Where possible, it examines RCAF niches with an eye towards how they may be able to contribute to a coalition in an A2/AD environment.

When applicable, this study also utilizes the OUP joint air campaign as a basis for comparison regarding the development of possible niches. Although no two conflicts are ever exactly the same and each new global situation will come with its own unique requirements, OUP (the Canadian-specific name Op MOBILE or simply "Libya" will also be used) offers a number of unique advantages as a reference point for determining the utility of potential niches. Libya served as the test case for the RCAF's new expeditionary concept; it allowed the RCAF to make contributions in areas in which the coalition faced shortages; it demonstrated a good balance between expeditionary and first-principle domestic Canadian air power responsibilities; it was commanded by an RCAF officer; and (perhaps almost lost in equation due to the subsequent regional difficulties experienced after the end of OUP) it was a UN-sponsored, NATO-led air campaign *that was brought to a successful conclusion*.[59] Largely because of this last factor, Libya is also a good example to utilize for comparison because, unlike the ongoing Op IMPACT, there is a decent amount of unclassified information written about it.

Finally, a key consideration is determining the return on investment that a niche approach for the RCAF can offer. While making a significant contribution in one area based on the specialization that a niche capability can provide may result in positive international and domestic feedback, this also needs to be balanced against the opportunities that are missed due to lack of capability—a capability that a more balanced approach would have ensured. It will, therefore, be essential to determine whether a particular niche is an RCAF force multiplier or force enabler. The following potential niches are examined:

a. air-to-air refuelling (AAR);

b. training and air advisory;

c. personnel;

d. jointness;

e. ISR;

f. air-expeditionary-wing concept; and

g. targeting.

NOTES

1. Kainikara, "Future Relevance of Smaller Air Forces," 11.

2. Kainikara, "Future Relevance of Smaller Air Forces," 3.

3. Kainikara, "Future Relevance of Smaller Air Forces," 3–5. Also see the following for a categorization of air forces, in particular identifying the RCAF as a "tier 2 air force," Matthew Preston, "Air Power Theory and Force Classification," *Royal Canadian Air Force Journal* 5, no. 3 (Summer 2016), accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2016-vol5-iss3-summer.page.

4. The RCAF *FAOC* clearly identifies the RCAF as a small air force. Canada, DND, *FAOC*, 1.

5. This term is attributed to then-Maj (now BGen, retired) Phil Garbutt, who was a student at CFC in 2003–2004. Richard Goette, compiler, "Concluding Remarks by the Commander 1 Canadian Air Division and the Chief of the Air Staff," in English, *Silver Dart Canadian Aerospace Studies*, vol. 2, 119. Then-MGen Marc Dumais utilized Garbutt's term in his address.

6. Kainikara, "Future Relevance of Smaller Air Forces," 3–4. Kainikara adds that "nations with larger air forces obviously have indigenous industry and support infrastructure to be self-sufficient to a very high degree." Kainikara, "Future Relevance of Smaller Air Forces," 4. Large air forces include the RAF, French Air Force and Germany's Luftwaffe, though one could argue that recent fiscal strains on them make this categorization debatable. Anrig, "Allied Air Power over Libya," 262.

7. Kainikara, "Future Relevance of Smaller Air Forces," 4. For Kainikara, the limited ability to sustain air power capabilities means "in terms of the quantum that can be produced at any one time, the length of time the air force can operate at the required level, and the national indigenous technological, industrial and infrastructural support available." Kainikara, "Future Relevance of Smaller Air Forces," 4.

8. Kainikara, "Future Relevance of Smaller Air Forces," 4.

9. Kainikara, "Future Relevance of Smaller Air Forces," 11.

10. Kainikara, "Future Relevance of Smaller Air Forces," 3. There is literature, in particular, on the revolution in military affairs (RMA) at the turn of the 21st century and the resulting capabilities gap between the US military and those of allied—especially NATO—countries. See, for instance, Andrew Richter, "The Revolution in Military Affairs and its Impact on Canada: The Challenge and the Consequences," Working Paper No. 28 (University of British Columbia, Institute of International Relations, March 1999); Elinor C. Sloan, "The Defence Capabilities Initiative and US–NATO Relations: Responding to the Revolution in Military Affairs," Research Note 99/07 (Ottawa: DND Directorate of Strategic Analysis Policy Planning Division, October 1999); "Can Europe Keep Up with the Revolution in Military Affairs?" *RUSI Journal* 144, no. 2 (April/May 1999); and Dr. Paul T. Mitchell, "The Revolution in Military Affairs and the Canadian Air Force," in *Air Power at the Turn of the Millennium*, ed. David Rudd, Jim Hanson, and André Beauregard (Toronto: Canadian Institute of Strategic Studies, 1999), 31–48.

11. Kainikara, "Future Relevance of Smaller Air Forces," 4.

12. Kainikara, "Future Relevance of Smaller Air Forces," 4. Kainikara adds that "a smaller air force, if efficiently managed, will achieve disproportionately high effects and is more likely to survive as an entity than a niche air force." Kainikara, "Future Relevance of Smaller Air Forces," 4–5.

13. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 55.

14. *Air Force Vectors* instead categorizes the RCAF as a combat-capable, multipurpose, global air force that is "able to perform, as a minimum, distinct aerospace operations across the spectrum of conflict. Generally, such forces also possess at least some capabilities in other areas (contributing, enabling, and support)." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 55. It is also worth mentioning the findings of a CFC syndicate at the 2004 Air Symposium, which noted that while a niche force might be world-class and highly regarded in the international community, it "also runs the risk of eliminating capabilities that Canada needs for its domestic requirements." Jill Zmud, "Transforming the Canadian Air Force to Meet the Challenges of the Future," in English, *Silver Dart Canadian Aerospace Studies*, vol. 2, 99.

15. Sanu Kainikara, "Professional Mastery and Air Power Education," *Royal Canadian Air Force Journal* 3, no. 4 (Fall 2014): 53, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss4-fall.page.

16. Kainikara, "Professional Mastery and Air Power Education," 53.

17. Goette and March, "Transforming Canada's Post-Cold War," 2–3.

18. In fact, the RCAF *FAOC* specifically advocates that the RCAF needs a balanced air force. Canada, DND, *FAOC*, 4.

19. Anrig, "Quest for Relevant Air Power," 82.

20. Maj K. C. Rubner, "A Niche Based Force Structure: Smart Capabilities for the Canadian Armed Forces" (Solo Flight paper, CFC, 2016), 2, accessed May 3, 2018, https://www.cfc.forces.gc.ca/papers/csc/csc42/solo/rubner.pdf.

21. Rubner, "Niche Based Force Structure," 12.

22. Anrig, "Quest for Relevant Air Power," 83.

23. Philip Sabin, "The Transformation of UK Air Power" (presentation, "The Transformation of European Airpower: Lessons for the Royal Danish Air Force" conference, Centre for Military Studies, The Kastellet, Copenhagen, Denmark, November 12–13, 2014); and Coates, "Joint Perspective of Technology."

24. LGen Hood remarked at the Air Power Symposium in April 2016 that the RCAF "must be careful not to completely exclude mass from our calculus." LGen Michael Hood, "Panel #1 Domestic, Continental and Deployed Operations" (speaking notes, Air Power Symposium 2016, 31 March – 1 April 2016), 10, accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/air-power-symposium/2016.asp.

25. Mayne, "Canadian Experience," 239.

26. Col David W. Read, "The Revolution in Military Affairs: NATO's Need for a Niche Capability Strategy," *Canadian Military Journal* 1, no. 3 (Autumn 2000): 17, accessed May 3, 2018, http://www.journal.forces.gc.ca/vo1/no3/index-eng.asp.

27. Rubner, "Niche Based Force Structure," 8, 10; and Anrig, "Quest for Relevant Air Power," 78.

28. Read, "Revolution in Military Affairs," 17, 21; and Anrig, "Quest for Relevant Air Power," 78.

29. Zmud, "Transforming the Canadian Air Force," 99.

30. Anrig, "Quest for Relevant Air Power," 68. Anrig elaborates on his ideas in Christian F. Anrig, *The Quest for Relevant Air Power: Continental European Responses to the Air Power Challenges of the Post-Cold War Era* (Maxwell Air Force Base, AL: Air University Press, 2011), accessed May 3, 2018, https://media.defense.gov/2017/Apr/07/2001728506/-1/-1/0/B_0125_ANRIG_QUEST_RELEVANT_POWER.PDF.

31. Anrig, "Quest for Relevant Air Power," 78.

32. Anrig, "Quest for Relevant Air Power," 78.

33. Anrig, "Quest for Relevant Air Power," 81.

34. Anrig, "Quest for Relevant Air Power," 82, 86.

35. Anrig, "Quest for Relevant Air Power," 82, 86. Quote from page 86. In particular, Anrig warns against the predilection of European countries to place emphasis on kinetic air power assets because they are seen as contributing to a country's defence in addition to being able to add to a coalition air campaign. Such "excessive role specialisation," on kinetic assets was based on the stigma of focusing on more supporting air power roles. The irony, Anrig notes, is that a focus on supporting assets, such as strategic air mobility, would in hindsight have paid greater dividends. This observation is an interesting one in a Canadian context given that Canada's acquisition of C-17s has been a force multiplier that has paid strategic dividends—and has even recently led to the acquisition of an additional aircraft.

36. Anrig, "Quest for Relevant Air Power," 87.

37. Read, "Revolution in Military Affairs," 22. Interestingly, Read, a Canadian Army officer, specifically mentions the US and advocates that European NATO members should adopt the niche capability strategy, but he is silent on Canada.

38. Read, "Revolution in Military Affairs," 22–23.

39. Read, "Revolution in Military Affairs," 22.

40. Read, "Revolution in Military Affairs," 22.

41. LGen Michael Hood, "Opening Remarks" (opening remarks, Air Power Symposium 2016, 31 March – 1 April 2016), 7, accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/air-power-symposium/2016.asp.

42. Rubner, "Niche Based Force Structure," 2.

43. Rubner, "Niche Based Force Structure," 6.

44. Rubner, "Niche Based Force Structure," 7.

45. Maj Frank Costello, "Restructuring Canada's Air Force: Adopting a Niche Capability in Air Transport" (Exercise New Horizons paper, CFC, 2001), 4, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/248/costello.pdf.

46. Costello, "Restructuring Canada's Air Force," 7. Costello also advocated eliminating the RCAF's current (at the time just tactical) and future AAR capability and concluded that an air mobility–niche would mean that "the air force would not be held hostage by the RMA and its expensive technological developments." Costello, "Restructuring Canada's Air Force," 18, 19. Quote from page 19.

47. Joel J. Sokolsky, "A Seat at the Table: Canada and its Alliances," *Armed Forces and Society* 16, no. 1 (Fall 1989): 21–22, accessed May 3, 2018, http://journals.sagepub.com/toc/afsa/16/1.

48. See Richard Gimblett, "The Canadian Experience of Network-Enabled Operations 1980," in *Naval Networks: The Dominance of Communications in Maritime Operations*, ed. David Stevens (Canberra, ACT: Sea Power Centre, 2012); and Richard Gimblett, *Operation Apollo: The Golden Age of the Canadian Navy in the War Against Terrorism* (Ottawa: Magic Light Publishing and DND, 2004).

49. Maj Jean Morin and Lieutenant-Commander Richard H. Gimblett, *Operation Friction: The Canadian Forces in the Persian Gulf* (Toronto: Dundurn, 1997), 175.

50. Richard Goette, *Sovereignty and Command in Canada–US Continental Air Defence, 1940–57* (Vancouver: University of British Columbia Press and the Canadian War Museum, 2018), 191.

51. Anrig, "Allied Air Power over Libya," 258–59.

52. LGen Hood, in particular, emphasizes the RCAF "supporting NATO's Standardization Office and the Five-Eyes Air and Space Interoperability Council," or ASIC. "Royal Canadian Air Force and NATO," 17. On ASIC, see LCol Christopher England, "Air and Space Interoperability Council (ASIC) and the RCAF" (Master of Defence Studies, CFC, 2016).

53. Andrew Richter, *Avoiding Armageddon: Canadian Military Strategy and Nuclear Weapons, 1950–63* (Vancouver: University of British Columbia Press, 2002), 17; Ray Stouffer, *Swords, Clunks & Widowmakers: The Tumultuous Life of the RCAF's Original 1 Canadian Air Division* (Trenton, ON: CFAWC, 2015), 13, accessed May 3, 2018, http://publications.gc.ca/site/eng/9.801039/publication.html; Goette, "Snapshot of Early Cold War," 52; and Bruce Barnes, "'Fighters First': The Transition of the Royal Canadian Air Force, 1945–1952" (master's thesis, Royal Military College of Canada, 2006).

54. Rubner, "Niche Based Force Structure," 15.

55. As LGen Hood remarked, "the focus must be on *effectors* rather than platforms … and capability design must consider the most effective way of assuring the delivery effect … taking all the environmental factors into account." [emphasis in original] Hood, "Panel #1 Domestic, Continental and Deployed Operations," 9.

56. As Australian air power academic Sanu Kainikara has observed, "a standing, all volunteer military force that is fully subscribed and has no deficiencies in its manning state is a utopian dream for defence planners." Kainikara, *Seven Perennial Challenges*, 34. Indeed, finding a "PY neutral" solution to any of the options offered in this study will be a challenge.

57. On pooling and sharing see: Air Marshal David Walker, "Leveraging NATO's Common Air Power," *Joint Air Power Competence Centre Journal*, no. 9 (2009): 6–8, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-9/; Wing Commander R. A. C. Wells, "The European Union's Pooling and Sharing: Political Rhetoric or Military Reality?," *Joint Air Power Competence Centre Journal*, no. 17 (2013): 75–78, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-17/; Lieutenant Colonel Geert 'Flash' Ariëns, "Pooling and Sharing: How Are We Doing?," *Joint Air Power Competence Centre Journal*, no. 17 (2013): 54–57, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-17/; and Anrig, "Quest for Relevant Air Power," 81. Perhaps the best example of pooling and sharing is the NATO AWACS force. For an example of how Canada contributed to this effort, see Pat Dennis, "NATO AWACS: Alliance Keystone for Out-of-Area Operations," *Canadian Military Journal* 8, no. 4 (Winter 2007–2008): 22–31, accessed May 3, 2018, http://www.journal.forces.gc.ca/vo8/no4/dennis-eng.asp.

58. Alexander, "Canada's Commitment to NATO," 8.

59. Mayne, "Canadian Experience," 239, 265. See also Wing Commander R. A. C. Wells, "One Swallow Maketh Not a Summer: What Success in Libya Means for NATO," *Joint Air Power Competence Centre Journal*, no. 15 (Spring/Summer 2012), accessed May 3, 2018, https://www.japcc.org/portfolio/journal-15/.

4
Air-to-Air Refuelling

Aerial refueling provides the capability to provide global effects, lethal and non-lethal, in a matter of hours.[1]

– Maj Dik Daso, former USAF Chief of the Air Force Doctrine Branch at the Pentagon

INTRODUCTION

Everyone needs gas for their airplanes, and AAR is, in many ways, the embodiment of the RCAF's reach vector.[2] Based on current capabilities and recent operational experiences, AAR is a clear niche that the RCAF can provide to coalition efforts on expeditionary operations. AAR is a force enabler and a force multiplier[3] that permits essential reach and strategic flexibility by sustaining RCAF—and allied—platforms in expeditionary operations. Notably, the RCAF has a proven recent track record of providing a valuable AAR capability to recent coalition endeavours. As Gladman has observed of Canada's contribution to OUP, then-NATO Supreme Allied Commander Europe (SACEUR) Admiral James Stavridis "repeatedly identified a lack of tankers as a major deficit in the NATO force structure" and remarked that "the presence of Canadian Polaris and Hercules tankers also was noted as being of particular value to the success of the operation."[4] RCAF Polaris aircraft were certified on and refuelled a large variety of allied aircraft from multiple nations,[5] and in the words of the RCAF commander Brigadier-General (BGen) Derek Joyce in his end-of-tour report, it was "the preferred [refuelling] platform by other nations participating in OUP."[6] Although one of the two Polaris aircraft that deployed with the CF188s was originally scheduled to return to Canada after arrival in theatre, such was the demand for AAR that it remained to provide tanker capability for coalition air operations. Even though one CC150T had to return to Canada for scheduled maintenance, it was replaced with two CC130T aircraft to continue the RCAF's vital AAR role.[7] In total, the RCAF's Polaris and Hercules tankers flew just under 400 missions and offloaded close to 19 million pounds [8.6 million kilograms] of fuel.[8]

AAR was "one of the most sought-after commodities of the campaign,"[9] and the RCAF tankers gained "a reputation for dependability and professionalism among Canada's NATO allies"[10] in providing this key coalition capability.

AAR enables the Canadian government to project power[11] and make an essential coalition contribution. As a supporting capability, AAR is more likely to receive multiparty political support because it potentially avoids the debates surrounding the deployment of kinetic air power assets. Notably, although Canada's government withdrew RCAF CF188s from Op IMPACT, it kept the other two platforms in theatre. One of them is the Polaris, a clear recognition by the government and coalition allies of the value of RCAF AAR assets; the other is the Aurora.[12] This chapter gives a brief overview of AAR as a key air power capability before examining specific allied (especially NATO) and coalition needs and articulating how the RCAF can fulfil an AAR niche-capability role.

CONTEXT

Though often overlooked, conducted in anonymity and even taken for granted,[13] AAR embodies the RCAF "reach" vector by extending the flight range and loiter time of all receiver aircraft and permitting them to project power.[14] It is an essential force multiplier that permits other RCAF platforms to operate in vast distances and ensures their persistence in the operational environment.[15] By extending not only the range but also the endurance of modern air power, AAR is truly a "force enabler, force extender."[16] AAR, thus, addresses one of the key tenets of air power by enhancing the persistence of aircraft and allowing a commander to more successfully exploit the advantages of the air power characteristics of speed and reach.[17] As RCAF capstone doctrine notes, AAR also enables force projection:

> The provision of AAR extends the flight range of receiver aircraft, thereby reducing the number of stops en route, maintenance requirements, and, ultimately, the response time to reach their AO [area of operations]. Additionally, AAR enables receiver aircraft to carry a greater payload on departure and to conduct multiple missions as required. AAR is thus a force enabler, a force multiplier, or both, depending on the mission being conducted.[18]

AAR's enabling of reach is essential in a country as geographically large as Canada and, thus, directly supports the first-principle capability to defend Canadian territory and sovereignty.[19] This is recognized in public opinion polls. It also reflects the findings of the House of Commons Standing Committee on National Defence report on Canadian aerial readiness. Its fourth recommendation is "that the Government of Canada recognize the importance of air-to-air refueling as it relates to the Royal Canadian Air Force's number one priority, which is sovereignty."[20] AAR also enhances RCAF expeditionary capabilities.

AAR permits the quick deployment of combat aircraft overseas into an AO (known popularly as "fighter drags").[21] This is particularly the case for the RCAF's CC150T

tankers. The Polaris tanker possesses a transatlantic radio capability, and its ability to fly at similar speeds to CF188s means that it can accompany Canadian fighters in transatlantic flights. This capability not only reduces the requirement to deploy highly tasked CP140 Auroras on transatlantic duckbutt missions[22] but also permits greater projection of power by ensuring that Canadian fighters can arrive in theatre more quickly and as a composite unit. Furthermore, keeping the Polaris in theatre with the fighters after arrival ensures that CF188s can commence operations more quickly. For instance, when the RCAF deployed its seven Hornet and two Polaris assets on Op MOBILE in March 2011 (the first ever transoceanic AAR mission for the CC150T), it took only three days between departure from Bagotville and the commencement of fighter missions from Trapani, Italy.[23]

AAR offers the potential opportunity for the RCAF to conduct air-bridge support operations. AAR can establish and then sustain forces (both RCAF and joint partners) by quickly moving personnel and equipment into an expeditionary theatre without the need for (or at the very least limiting) en route refuelling stops.[24] Although the RCAF does not currently have the capability to conduct air-bridge operations because most of its air transport aircraft are not AAR receiver-capable,[25] this is an option that the RCAF may want to explore to enhance its expeditionary capabilities.

Targets in today's expeditionary warfare necessitate access to greater AAR assets. The requirements for securing air superiority, addressing dynamic targeting and providing constant close air support to engaged ground forces mean that both ISR and fighter aircraft will need greater loiter times. It is no wonder, then, that wartime places greater demand for AAR to support not only targeting but also a wide variety of fighter and ISR operations.[26] This was borne out by the RCAF experience during the Libya air campaign, as its CC150T and CC130T tankers had to deal with a "hectic operational tempo" where they "were sometimes flying two missions per day and responsible for 4.1 per cent of all NATO refueling sorties."[27] The ability of AAR to extend the range of fighter aircraft not only ensures the more efficient and effective use of these platforms in theatre but also is essential in a campaign where basing is limited.[28] Moreover, since AAR can also support air command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) missions, it is also a valuable enabling capability that can be employed to support UN PSOs and HADR missions.[29]

Lastly, AAR will be essential in any future A2/AD conflict. The concept of A2/AD presupposes an adversary desirous of preventing allied forces from operating from in-theatre bases, thus necessitating allied projection of power over long distances in an attempt to penetrate defences. Doing so will require AAR to extend the range of various platforms and enable their ability to reach into the operational environment. This is especially the case in the Pacific, where long distances and "heavily defended airspace around China and the Strait of Taiwan will demand extremely long reach, precise stand-off engagement, and the heavy use of tankers."[30] However, the use of AAR in an A2/AD environment will also require caution and careful planning, as AAR assets will be prime targets of the enemy to deny allied forces access to the operational environment.[31]

There are essentially two types of AAR: boom as well as probe and drogue. Boom AAR consists of a large boom extended from the tanker aircraft that the boom operator aboard the tanker "flies" to connect to the refuelling point on the receiver aircraft. The advantages of the boom system are that it allows for greater volumes of fuel to be transferred quickly and puts less pressure on the receiver pilot for precise manoeuvring of their aircraft. The disadvantage is that the boom system costs more. Notably, USAF primarily uses the boom system for its AAR fleet, though it also maintains a probe-and-drogue capability. The probe-and-drogue system consists of probes fitted on the wings of a tanker aircraft from which basket-like drogues with hoses attached extend out to the receiving aircraft. This system requires greater involvement from the receiver pilot, who must manoeuvre the receiving nozzle on their aircraft to couple with the drogue basket to commence refuelling. The advantage of the probe-and-drogue system is that it is more flexible, in that it permits the refuelling of multiple aircraft at the same time and also can service a variety of fixed-wing and rotary-wing aircraft. The disadvantage is that the lower transfer rate of a probe-and-drogue system means that it takes longer for a receiver aircraft to refuel. Notably, the probe-and-drogue system is the most widely used refuelling system worldwide as well as the one preferred and employed by the USN, United States Marine Corps (USMC) and a number of NATO countries. The RCAF currently only possesses a probe-and-drogue capability.[32] Nonetheless, coalition stressors mean that the RCAF can fill an important AAR demand.

ALLIED AND COALITION NEEDS

Investing in an RCAF AAR niche capability would permit Canada to play a key role in coalition operations. An RCAF AAR niche not only would allow Canada to continue to ensure reach and strategic flexibility in domestic first-principle roles and expeditionary air power projection but also could take some of the AAR burden off its allies. The current fiscal and security environment means that Canada can no longer rely on the good graces of its allies—especially USAF—for AAR.[33] For a long time, USAF has shouldered a large AAR burden by providing the vast majority of tanker requirements for not only itself but also its joint partners and allies in coalition operations.[34] However, the USAF tanker fleet is under increasing pressure due to ageing aircraft, resulting in the real possibility of USAF experiencing a tanker shortage in the near future. Not only have fiscal issues in recent years placed restraints on USAF tanker availability (for its own forces and also allies), but a number of its AAR platforms are getting rather old (its main platform, the KC-135, was procured in the Eisenhower era). These platforms increasingly require maintenance, while plans for replacement aircraft have been mired in controversy, causing multiple delays. Only recently has the KC-46A Pegasus replacement programme begun to see the roll-out of new aircraft, and enduring fiscal restraints mean that USAF will only be able to replace 33 percent of its ageing Cold War–era tankers.[35] This has led to a variety of ideas to supplement the deficit in AAR, including calls to investigate the feasibility of incorporating civilian air tankers into the American Civil Reserve Air Fleet construct.[36] It has also led to calls from USAF for its allies, including Canada, to pick up the slack.

The pressure placed on alliance AAR resources during the 2011 OUP air campaign demonstrated that tankers are a major deficit in the NATO force structure. Although some coalition nations, including Canada, contributed tankers, once again the campaign would not have been possible without significant American AAR support.[37] Even though the US transferred leadership of OUP to other NATO nations, USAF provided 70 percent of NATO's AAR requirements, which Anrig called "USAF's key contribution for the remainder of the campaign."[38] Commenting on OUP, Admiral Stavridis highlighted "the importance of tankers to the projection of US and NATO air power, and that their development and increased fielding should be a priority for NATO nations."[39] As one British airman has observed, "the real argument (not even behind closed doors) is that Europe, according to the US, is not pulling its weight."[40] Although a number of NATO nations have discussed adopting a more balanced approach for providing AAR for coalition operations and there has been some recent progress in NATO nations (including Canada) introducing new AAR platforms and recapitalizing existing tanker capability, arguably much more could be done to address the future gap in tankers that threatens to place limits on alliance operations.[41] Part of the reason for this challenge has been the tendency among many European NATO nations to focus on developing kinetic air power vice non-kinetic supporting air power capabilities in their attempt to close the post–Cold War capability gap with the US.[42] Anrig notably describes this as a "disequilibrium between the spear and the shaft [that] will likely hamper European operations in the future."[43]

Augmenting the RCAF's probe-and-drogue capabilities offers numerous interoperability opportunities to play a key role in coalition expeditionary operations. For one, it promises to enhance RCAF "joint combined" capabilities by potentially increasing flexibility and improving RCAF interoperability with the USN and USMC, which both use the probe-and-drogue system. These US services have demonstrated preference for allied tankers over USAF probe-and-drogue tankers because the latter only employ a single hose from their KC-135s, while the former employ multiple hoses, thereby ensuring that more aircraft can be refuelled at one time.[44]

The RCAF's probe-and-drogue capability also ensures greater flexibility and improved interoperability with other coalition allies, the majority of which also use this AAR system.[45] This was best demonstrated in OUP, when RCAF CC150Ts were quickly certified to service multiple coalition receiver platforms and then commenced refuelling "almost every type of allied aircraft (including some unique experiences, such as when a CC-150 topped up a Swedish Air Force JAS 39 Gripen for the first time on May 18 [2011])."[46] As Mayne has noted, RCAF CC150Ts became "one of the preferred refueling platforms within the coalition."[47] This is a role that the RCAF continues to play in Op IMPACT, where an RCAF CC150T has refuelled a variety of allied aircraft, including RCAF, RAAF and USN F/A-18s; French Mirage 2000Ds, Super Etendards and Rafales; RAF and Italian EuroFighers/Typhoons; and USN AV-8Bs and EA-18G Growlers.[48]

The advantages of the RCAF investing in an AAR niche are twofold. First, Canada would no longer have to rely on allied—especially American—AAR, thus giving the RCAF

greater flexibility in expeditionary endeavours and offering the future possibility of conducting independent operations.[49] Second, Canada could help take (though of course not completely alleviate) the load off USAF by providing a key and valued capability to allies in coalition expeditionary operations. The remainder of this chapter explores how the RCAF can approach a possible AAR niche capability.

HOW THE RCAF CAN FULFIL THE AAR NICHE

If the RCAF is to enhance its AAR capability by procuring additional platforms, it should continue to pursue aircraft with "combi" or multirole tanker transport (MRTT) features that combine an AAR capability with an airlift one.[50] The Polaris, of course, has this feature, and it is consistent with current and near future allied AAR procurement practices such as the American Pegasus, the Australian KC30, the RAF's Airbus A330 Voyager KC2, and the Airbus A400M of several NATO European nations, to name only a few.[51] In addition to airlift, newer modifications to AAR platforms that enhance their versatility have also included the roll-on beyond-line-of-sight enhancement (ROBE) communication system for USAF's KC-135 tanker, which "virtually transforms [it] … into a command and control (C2) aircraft";[52] medical evacuation, such as the one conducted by an RCAF Polaris from Sigonella, Italy, to Landstuhl, Germany, on 30 June 2011 during Op MOBILE;[53] a "smart tanker" platform with modern navigation and improved situational awareness capabilities via communications suites such as Link 16 real-time data links aboard the RAAF's KC-30 MMRT tanker or USAF's KC-135;[54] and a tactical airdrop capability for the Airbus A400M.[55] Some in the AAR community are critical of the dual role / multirole aircraft due to worry that it will distract from the primary tanker mission.[56] However, it is a more viable option for Canada given *Air Force Vectors*'s and the RCAF Commander's stated preference for multirole and swing-role platforms.[57] Canadian political appeal is twofold: more-efficient aircraft (because of their greater versatility) and host-nation political cooperation with respect to basing because tankers are less controversial to host than bombers and fighters.[58]

If the RCAF is to invest in an AAR niche, it should consider adopting the RAAF model of acquiring a boom-capable platform in addition to enhancing its probe-and-drogue capability to maximize versatility.[59] Since the CC177 is capable of inflight refuelling via boom only,[60] boom-capable RCAF AAR assets offer the opportunity to support this very important RCAF strategic asset, whether in an air-bridge role or in a soft-power role such as PSOs and HADR. In addition, since USAF prefers the boom system of AAR, RCAF possession of a boom capability can ensure greater interoperability with its closest air power partner.[61] Boom-capable RCAF AAR platforms also offer the possibility that they could be used to refuel American strategic bombers in an A2/AD conflict, thereby performing a key role for Canada's closest ally.[62]

If Canada is serious about preparing its air force to operate in an A2/AD environment, the RCAF may want to consider developing the "buddy" AAR system that the USN has

adopted, whereby F-18s (or any future fighters) can refuel from themselves.[63] Although some have criticized this system as an inefficient use of valuable fighter resources,[64] practical experience has shown that this AAR method may be useful for deep penetration missions where allies cannot risk AAR aircraft operating in adversary airspace.[65] Although there were a couple of instances during OUP when a tanker was positioned over Libyan territory to support a deep strike,[66] this was a much more permissive environment than an A2/AD situation would entail. Although RCAF CC150Ts operated (for the first time) in a semi-permissive environment during Op IMPACT,[67] this pales in comparison to the potential degraded environment of an A2/AD conflict.

The RCAF may also want to consider equipping its AAR aircraft with a self-defence capability if it anticipates operating in a contested environment.[68] The RAAF, for instance, is providing defences for protection against SAMs in their new KC30 tanker fleet.[69] Since RCAF CC130T tankers already possess a self-defence suite of flares and chaff,[70] they could possibly play a key role in operating out of airfields in a degraded environment.

An RCAF AAR niche should also ensure adherence to common NATO AAR practices to ensure interoperability. This includes producing RCAF AAR doctrine[71] that is consistent with NATO doctrine; maintaining up-to-date clearances to ensure technical compatibility; where possible, minimizing national caveat restrictions; and developing other AAR standardized procedures and plans.[72] It is also advisable to send RCAF staff officers (if they have not been) to the NATO Specialized Heavy Air Refuelling Course (SHARC) to develop a NATO AAR planning subject matter expert (SME) capability.[73] Emphasis in AAR training and professional military education (PME) should be placed on ensuring the flexible employment of tanker assets.[74]

If the RCAF decides to adopt an AAR niche, it should consider developing one for helicopters. As an air force that embodies the "indivisibility of air power," the RCAF already has vast experience and expertise in operating rotary-wing aircraft. AAR for helicopters is only possible via probe and drogue, which is the AAR method that the RCAF currently has. To refuel helicopters requires a larger-sized drogue basket to ensure a connection at lower speeds, so this will necessitate RCAF investment in this equipment.[75] The CC130T is suited for helicopter refuelling. Whereas its slow speeds made it very challenging to refuel fighter aircraft during OUP,[76] these same slow speeds make the Hercules tanker ideal for rotary-wing AAR.[77] An RCAF AAR capability for helicopters would also offer the advantage of enhancing RCAF tactical air-to-air integration by ensuring greater interoperability between a variety of platforms across Canada. In addition, it can improve response time for SAR and major air disaster (MAJAID) missions within Canada, thereby enhancing domestic first-principle air power responsibility capabilities and reinforcing public support.[78] An AAR niche specializing in refuelling rotary-wing aircraft promises to enhance and improve the RCAF's joint-combined capability to operate with allied navies, armies and marines that operate organic rotary-wing air power as well as allied interoperability by offering a key role to be plugged into a coalition endeavour.

NOTES

1. Quoted in Reina J. Pennington, "Tankers: Never Loved Until They're Needed," *Air & Space* (October/November 1997): 27.

2. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 39. Indeed, the main impetus for the early Cold War development of AAR was to enable USAF Strategic Air Command nuclear bombers to reach targets deep inside the Soviet Union. Noted air power advocate and Strategic Air Command Commander General Curtis LeMay was, therefore, a key supporter of USAF AAR initiatives. Rebecca Grant, "The Tanker Imperative," Mitchell Paper 2 (Mitchell Institute Press, 2009), 6, accessed May 3, 2018, https://secure.afa.org/Mitchell/reports/MP2_TankerImperative0409.pdf.

3. Current RCAF doctrine gives the following definitions for force multiplier and force enabler. Force multiplier: "A capability provided to a force that enhances the probability of success in mission accomplishment." Force enabler: "A capability provided to a force that is essential to mission accomplishment." Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 55–56.

4. Gladman, "Future of Allied Air Power: The United States Air Force," 38, note 161.

5. Mayne, "Canadian Experience," 257–58.

6. 1630-1 (Comd TF LIB), 7 November 2011, End of Tour Report – Task Force Libeccio, 4, A-2/13.

7. Mayne, "Canadian Experience," 257–58.

8. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 4; LCol S. Lamarche, "The Backbone of Reach & Power: Air-to-Air Refueling in the RCAF" (Master of Defence Studies, CFC, 2015), 69, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/317/286/lamarche.pdf.

9. Mayne, "Canadian Experience," 250.

10. Meghan Potkins, "Winnipegger Flies Fuel for Freedom – 'Prairie Boy' Helps Enforce NATO No-Fly Zone over Libya," *Winnipeg Free Press*, [n.d., likely summer 2011], attached to 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, K1-7/25.

11. In embodying the reach vector, AAR is also a force enabler for the power vector. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 40.

12. Canada, DND, "Operation IMPACT," accessed May 3, 2018, http://www.forces.gc.ca/en/operations-abroad-current/op-impact.page; Rosemary Barton, "Justin Trudeau to Pull Fighter Jets, Keep Other Military Planes in ISIS Fight," CBC News, November 26, 2015, accessed May 3, 2018, http://www.cbc.ca/news/politics/government-position-fighter-jets-1.3338186.

13. Grant, "Tanker Imperative," 3; and Lamarche, "Backbone of Reach & Power," 67.

14. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 39.

15. Grant, "Tanker Imperative," 4; and Lamarche, "Backbone of Reach & Power," 28, 29.

16. "Air-to-Air Refueling Provides a Force Multiplier for Expeditionary Warfare," *International Defence Review,* January 11, 2006, 2.

17. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 14; and Gladman, "Future of Allied Air Power: The United States Air Force," 37.

18. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 35.

19. Lamarche, "Backbone of Reach & Power," 50. Indeed, the original justification for transforming the current four RCAF CC130s into a tanker role was to provide a domestic AAR capability. Mayne, "Canadian Experience," 257.

20. Canada, House of Commons, Standing Committee on National Defence, *Canada and the Defence of North America*, 61.

21. Rebecca Grant, "9 Secrets of the Tanker War" (IRIS Independent Research Report, September 2010), 5; and Lamarche, "Backbone of Reach & Power," 64.

22. "An airborne escort postured to provide emergency assistance to other aircraft. Note: A duckbutt is normally performed over water." *DTB* record 43965.

23. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 1, A-5/13, A3/13; and Mayne, "Canadian Experience," 250.

24. Grant, "Tanker Imperative," 10–11; and Lamarche, "Backbone of Reach & Power," 63.

25. Indeed, the vast majority of RCAF platforms are not receiver-capable. Email from RCAF officer to author, September 18, 2016.

26. Grant, "9 Secrets of the Tanker War," 5; Lamarche, "Backbone of Reach & Power," 62; LGen Lloyd Campbell (Ret'd), "Op IMPACT: Canada and the Battle Against Middle East Terrorism," *Airforce Magazine* 39, no. 2 (2015): 25; Gladman, "Future of Allied Air Power: The United States Air Force"; Maj Chad Taylor, "Double Counting or Counting Double? The Future of NATO's Tanker Transport Fleet," *Joint Air Power Competence Centre Journal*, no. 18 (Autumn/Winter 2013): 34, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-18/; "Air-to-Air Refueling Provides," 2; and Grant, "Tanker Imperative," 10, 16, 20. For example, Rebecca Grant of the USAF Association's Mitchell Institute nicely captures the vital role that AAR provided in Afghanistan: "Tankers were vital to four tasks: gaining quick air supremacy; supporting special operations and airdrop missions; sustaining fighters and bombers on station; and delivering supplies and fuel for forces on the ground." Grant, "Tanker Imperative," 15.

27. Mayne, "Canadian Experience," 258.

28. "Filling Air-to-Air Refueling Gap," *Aircraft Engineering and Aerospace Technology* 78, no. 2 (2006): 157; and Lamarche, "Backbone of Reach & Power," 68. Overseas basing of tankers is also a key issue. See Grant, "9 Secrets of the Tanker War," 7.

29. Taylor, "Double Counting or Counting Double?," 34; and Grant, "Tanker Imperative," 26. However, as noted previously, the RCAF would need to modify its air transport and ISR fleets to be AAR-receiver capable to make this capability a reality for Canada.

30. Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 18. Also see Grant, "9 Secrets of the Tanker War," 6, 8.

31. For instance, USAF Lieutenant Colonel Flaherty notes specifically that the Chinese air force's air campaign planning entails the targeting of aerial tankers in addition to other power-projection platforms such as AWACS, combat aircraft and airlift. Flaherty, "Red Wings Ascendant," 100.

32. "Air-to-Air Refueling Provides," 5, 7–8; and Lamarche, "Backbone of Reach & Power," 10–11. See also Paul S. Killingsworth, *Multipoint Aerial Refueling: A Review and Assessment* (Santa Monica, CA:

RAND, 1996), accessed May 3, 2018, https://www.rand.org/pubs/documented_briefings/DB152.html; and Christopher Bolkcom and Jon D. Klaus, "Air Force Aerial Refueling Methods: Flying Boom versus Hose-and-Drogue" (Library of Congress, Congressional Research Service, May 11, 2005).

33. Lamarche, "Backbone of Reach & Power," 1–2, 52. As RCAF LCol Lamarche so aptly put it, "the potential exists when the US will face its own shortage of tankers for other missions of equal importance to their defence, leaving the RCAF 'high and dry.'" Lamarche, "Backbone of Reach & Power," 52.

34. Grant, "9 Secrets of the Tanker War," 1; Taylor, "Double Counting or Counting Double?," 32; and Gladman, "Future of Allied Air Power: The United States Air Force," 38. Again Rebecca Grant capably captures the pressure that USAF faces in this age of high-intensity expeditionary operations: "In US Central Command's theater alone, the statistics are nothing short of compelling. The average day in 2009 sees some 45 to 50 KC-135 tankers in operation. Those same tankers pass along fuel to as many as 250 receivers of all types. And that is just in one area of the world. In a crisis, the tankers might be required in two or possibly even three different areas." Grant, "Tanker Imperative," 3. In addition to an over-reliance on USAF AAR platforms in modern air campaigns, there is also an over-reliance on USAF-trained AAR planners. Maj Joshua "Beaker" Chambers, "Be Advised, Training in Progress: Operational-Level Air-to-Air Refueling Planning Course Begins to Meet a NATO Need," *Joint Air Power Competence Centre Journal*, no. 20 (Spring/Summer 2015): 33, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-20/.

35. Gladman, "Future of Allied Air Power: The United States Air Force," 38; "Air-to-Air Refueling Provides," 4; Bolkcom and Klaus, "Air Force Aerial Refueling," 3; and Lamarche, "Backbone of Reach & Power," 52–53. As of 2015, the average age of the USAF KC-135 fleet was 51 years. On the controversy surrounding the USAF AAR recapitalization project, see Grant, "Tanker Imperative"; and Grant, "9 Secrets of the Tanker War."

36. Michael W. Grismer Jr., "Transforming the Civil Reserve Air Fleet," *Joint Force Quarterly*, no. 63, (4th Quarter 2001): 135–36, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/.

37. Taylor, "Double Counting or Counting Double?," 32.

38. "Filling Air-to-Air Refueling Gap," 157. Quote from Anrig, "Allied Air Power over Libya," 263–64.

39. Gladman, "Future of Allied Air Power: The United States Air Force," 38.

40. Wells, "European Union's Pooling and Sharing," 76. The numbers are staggering. According to the conference findings of the NATO AAR Working Group 2013, of the 728 tankers in NATO, only 67 were non-American. By 2025, the projected numbers include a modest increase for the non-American tankers ratio—731:93. Notably, the working group reports no anticipated increase in the number of RCAF tankers by 2025. Numbers taken from Taylor, "Double Counting or Counting Double?," 33.

41. Taylor, "Double Counting or Counting Double?," 32; "Filling Air-to-Air Refueling Gap," 157; and Wells, "European Union's Pooling and Sharing," 76.

42. Anrig, "Quest for Relevant Air Power," 82.

43. Anrig, "Allied Air Power over Libya," 262–63.

44. Bolkcom and Klaus, "Air Force Aerial Refueling," 4–6; "Air-to-Air Refueling Provides," 2, 10; and Killingsworth, *Multipoint Aerial Refueling*, ix, xii.

45. Killingsworth, *Multipoint Aerial Refueling*, ix, xii.

46. Mayne, "Canadian Experience," 258.

47. Mayne, "Canadian Experience," 253.

48. Campbell, "Op IMPACT," 25. As of 18 February 2017, the RCAF Polaris attached to Op IMPACT had conducted 680 sorties, offloading 39,900,000 pounds [18,100,000 kilograms] of fuel to coalition aircraft. Canada, DND, "Operation IMPACT."

49. Lamarche, "Backbone of Reach & Power," 2.

50. Campbell, "Op IMPACT," 25; "Air-to-Air Refueling Provides," 7; Taylor, "Double Counting or Counting Double?," 31; and Grant, "9 Secrets of the Tanker War," 11. This is also consistent with *Air Force Vectors*'s advocacy of the RCAF pursuing multirole platforms. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 41.

51. Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 18; "Air-to-Air Refueling Provides," 6; and Taylor, "Double Counting or Counting Double?," 34–35. MRTT is also consistent with plans for the Polaris replacement. "Strategic Tanker Transport Capability," in *Defence Acquisition Guide 2016*, Canada, DND, accessed May 3, 2018, http://www.forces.gc.ca/en/business-defence-acquisition-guide-2016/aerospace-systems-916.page. This guide notes that the project to replace the Polaris "is pending the result of the evaluation to replace the CF-188, due to different fuel receiving systems in use by various fighter aircraft."

52. Rebecca Grant, "Playing With Fire," *Air Force Magazine* 92, no. 7 (July 2009): 32. Quote from Lamarche, "Backbone of Reach & Power," 82.

53. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, AA-3/13.

54. "Air-to-Air Refueling Provides," 4; Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 18; and Grant, "Tanker Imperative," 21, 23.

55. Taylor, "Double Counting or Counting Double?," 34–35.

56. See Taylor, "Double Counting or Counting Double?"; and Wells, "European Union's Pooling and Sharing," 76.

57. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors* 41; and Hood, "Panel #1 Domestic, Continental and Deployed Operations," 10.

58. Grant, "Tanker Imperative," 15; and Kainikara, *Seven Perennial Challenges*, 48.

59. Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 18.

60. Lamarche, "Backbone of Reach & Power," 63.

61. The British Ministry of Defence has been criticized on this very issue. As Wing Commander Wells sarcastically remarks, "if only someone within the UK MoD [United Kingdom Ministry of Defence] had had the foresight to purchase Voyager with a Boom in addition to Probe and Drogue! (I believe this concept is known as Interoperability)." Wells, "European Union's Pooling and Sharing," 76.

62. Gladman, "Future of Allied Air Power: The United States Air Force," 39; and Bolkcom and Klaus, "Air Force Aerial Refueling," 7. This, of course, presupposes that USAF would give the RCAF such a vital role; though unlikely, it is not completely beyond the realm of possibilities (i.e., considering possible attrition of USAF tanker assets necessitating RCAF assistance).

63. "Air-to-Air Refueling Provides," 6.

64. Bolkcom and Klaus, "Air Force Aerial Refueling," 4.

65. The buddy AAR system could also prove useful by enhancing the CF188 training capability. Email to author from RCAF officer, September 16, 2016.

66. Mayne, "Canadian Experience," 253.

67. Campbell, "Op IMPACT," 25.

68. On the importance of RCAF platform self-defence capabilities or self-protection systems, see Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 43.

69. Gladman, "Future of Allied Air Power: The Royal Australian Air Force," 18–19, where Gladman cites "KC-30A Multi Role Tanker Transport," Australia, RAAF, accessed May 3, 2018, https://www.airforce.gov.au/technology/aircraft/air-mobility/kc-30a-multi-role-tanker-transport. As of 2009, USAF tankers operating in the United States Central Command (CENTCOM) region were fired on 19 times. Grant, "Playing With Fire," 30. The danger posed to tankers is indeed pronounced; as one author observed, "A tanker is essentially a 300,000-pound [136,078 kilogram] gas can—one flak hit could be lethal." Pennington, "Tankers," 27.

70. Email to author from RCAF officer, September 16, 2016.

71. At the time of writing, there is no RCAF AAR doctrine, thus necessitating reference to USAF doctrine. See Lamarche, "Backbone of Reach & Power," 5, 36, 60.

72. Maj William Clements, "Next Generation Tankers: Standardising Future AAR Needs," *Joint Air Power Competence Centre Journal*, no. 10 (2009): 19–20, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-10/; Lieutenant Colonel Manuel de La Chica Camúñez, "A Happy Marriage But Still With Sorrow: Air-to-Air Refuelling and Interoperability," *Joint Air Power Competence Centre Journal*, no. 16 (Autumn/Winter 2012): 40–42, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-16/; and Taylor, "Double Counting or Counting Double?," 34.

73. Chambers, "Be Advised, Training in Progress," 33–36.

74. This was one of the observations of CC150T operations in Op MOBILE: "Flexible employment of aircraft, with C2 authorizing changes in AAR op [operations] area, moving from one op area to another, and even leaving the op area entirely, so as to pick up receivers in an expeditious manner and get them to their designated op area in the Joint Operations Area (JOA), has been quite good. As such, the central tenets of the AAR mission, namely extending the range, payload and endurance of fighter aircraft, have been maximized at the tactical C2 level during this Op [operation]." 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, AA-3/13.

75. "Air-to-Air Refueling Provides," 8–9.

76. The Hercules aircraft had to operate at their maximum speed and in many cases had to go into a shallow dive to pick up more speed to refuel the fighter jet. Paul Koring, "Canada's Hercs Star in Dangerous Ballet of Mid-air Refueling," *Globe & Mail*, [n.d., likely summer 2011], attached to 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, K1-4/25.

77. Lamarche, "Backbone of Reach & Power," 36.

78. Lamarche, "Backbone of Reach & Power," 6, 84.

5
Training and Air Advisory

TRAINING

HISTORICAL PROGRAMMES

The RCAF could consider developing an air-training niche in support of alliance and coalition partners. Training is a mainstream and cornerstone form of air power. Generating pilots and aircrew ensures that the RCAF has the flying personnel to conduct both first-principle and alliance/coalition expeditionary operations. It is also an air power role that Canada can undertake to assist its allies. The RCAF has a proud history of excellence in training allies and coalition partners. Indeed, one could argue that the RCAF's ability to generate pilots and aircrew in the British Commonwealth Air Training Plan (BCATP) was one of the most important air power contributions that Canada made towards Allied victory during the Second World War. Moreover, the NATO Air Training Plan was a vital Canadian alliance contribution during the "long watch" of the Cold War and beyond.[1] Since the RCAF embodies the "indivisibility of air power" and, therefore, operates platforms that are organic to other services in various countries, the RCAF has been able to develop expertise in training on a wide variety of air power fixed- and rotary-wing platforms. In addition to supporting NATO partners by continuing the NATO Flying Training in Canada (NFTC) programme (which is due to expire in 2021[2]), a robust RCAF training programme could also conduct training for pilots and aircrew from a variety of nations around the world.

TRAINING OPTIONS

A training niche could take place in two ways: physical-platform training and synthetic training. Physical-platform training is defined here as "traditional" training in the form of instructors and trainees physically being in aircraft to learn how to fly and operate platforms. Historically, the RCAF has had success in conducting this type of training for a variety of partners. Maintaining and perhaps even expanding physical-platform training

in the NFTC programme beyond fighter training to training on other platforms offers the RCAF an opportunity to enhance its ability to seamlessly operate with Canada's NATO allies (i.e., allied interoperability, which directly supports the RCAF's integrated vector[3]) through shared operational doctrine and training philosophy.[4] Moreover, the RCAF has recent experience in providing multiplatform training to international partners in the form of the Canada Wings programme, which trains rotary-wing and multi-engine pilots from a number of countries.[5]

Synthetic training is defined here as the use of simulators vice physical aircraft to conduct flying training. The RCAF has recently moved towards synthetics in its approach to air training to save costs in operating aircraft in a training role (notably airframe wear and tear), to free up more aircraft to be employed on operations, to reduce the RCAF's carbon footprint to be more environmentally responsible as well as to train in scenarios that would otherwise be too dangerous and cost prohibitive for physical platforms.[6] This simulation strategy can be adapted to conduct training for international allies and partners. Since a number of allies and partners operate the same types of platforms as the RCAF, Canada can either offer the use of its training facilities (i.e., 426 Squadron's CC130J facility in Trenton and 450 Squadron's CH149 Chinook facility at Petawawa[7]) either by donating simulator time or through a payment arrangement. Enhancing or increasing the training capabilities of these facilities for use by international partners may, therefore, be lucrative for Canada (in addition to enhancing prestige for Canada in the eyes of its allies), while at the same time supporting Canadian aerospace industrial partners such as CAE Inc.

CURRENT PROGRAMMES

An RCAF air-training niche focused on allied and other international partners offers a number of potential benefits for the RCAF and Canada. It gives the RCAF the opportunity to enable the air power capabilities of a number of international partners and is, thus, consistent with government desires to enhance Canadian international cooperation and partnerships. Furthermore, the air-training niche would support Canada's enduring military role of contributing to international defence and security.[8] Moreover, conducting training with allies in schemes such as the NFTC programme and the Canada Wings programmes offers specific benefits, such as "shared capital costs and better economies of scale, while at the same time providing an opportunity for vital exchanges of experience and training doctrines in a multi-national setting."[9] There is also a great benefit to both Canadian and foreign pilots, in that these training programmes give pilots early exposure (cultural, technical, social, professional networking, etc.) to working closely with international partners—a key asset for future coalition expeditionary operations. In addition, much of the technical support as well as classroom and simulator training are conducted by civilian contractors, such as Allied Wings and Bombardier.[10] This offers important benefits to the sustainment, growth and enhanced innovation of the Canadian aerospace industry, which is an important objective of government defence policy.[11]

RECOMMENDATIONS

Lastly, an RCAF air-training niche may be able to contribute to preparation for an A2/AD conflict by conducting air exercises. As Captain Mike Rafter has noted, Canada's "seemingly limitless and uncongested airspace make it the ideal location for the training of aircrew in low-level tactics and operations."[12] Canada has a history of conducting international air-training exercises that incorporate the latest operational concepts, tactics and procedures to prepare for warfare in the form of the 5 Wing Goose Bay training exercises and Exercise MAPLE FLAG at 4 Wing Cold Lake.[13] These exercises should be revisited and enhanced with a specific focus on addressing the A2/AD threat from potential adversaries. In summary, given the RCAF's demonstrated excellence in training and the reasons outlined in this section, it may want to consider developing an air-training niche.

AIR ADVISORY

INTRODUCTION

Based on the RCAF's excellence in training, it should consider developing an air-advisory-capability niche. It would consist of contributing to allied and coalition efforts in generating, building, training and supporting allied air power capabilities overseas. Such a niche capability should not entail investment in a massive Canadian air-advisory programme along the lines of USAF's current massive effort,[14] as this would be beyond RCAF resources. Instead, the RCAF should plug its expertise and modest resources into existing or future programmes. An RCAF air-advisory role would focus on specialized capabilities predetermined by the RCAF leadership and be based on burden-sharing principles geared towards contributing to larger USAF or NATO air-advisory endeavours. Indeed, it is this very type of air-advisory contribution that NATO is calling for from member nations, including Canada.[15]

CAPACITY BUILDING

An RCAF air-advisory capability is a way for Canada to contribute to a state-building role in failed or failing states. As *Future Security Environment 2013–2040* notes, "capacity building in select countries advances Canadian foreign and defence policy interests by utilizing Canada's experience in peace, order, and good government to build similar governance infrastructures."[16] Air advisory is the air power contribution to capacity building that the RCAF can make either individually (i.e., the Canadian government's sole choice to contribute to a coalition capacity-building effort) or as part of a wider Government of Canada capacity-building strategy in a failed or failing state.

The capacity-building characteristics of air advisory also make it an attractive approach to COIN for the Canadian government. Although the Canadian government desires to

avoid protracted and deep engagements, such as the recent Afghanistan conflict, these may be unavoidable. Air power in the form of an air-advisory capability offers the government a way to contribute to a state-capacity role in a way that entails less cost of blood and treasure than a boots-on-the-ground army approach to COIN entails. Compared to the army COIN approach, air advisory entails a low-cost, small-footprint approach to achieving security objectives and is, thus, a force multiplier. To be sure, there is always a degree of danger to deploying personnel into an unstable foreign country. However, as a supporting vice a kinetic role, air advisory entails less exposure to personnel than an army approach. In addition, air advisory empowers host-nation personnel to conduct kinetic operations vice one's own forces.[17] It is, therefore, a good option for the Canadian government if it wants to avoid kinetic actions which might risk blue-force casualties and the possibility of collateral damage.

ASSISTING FAILING STATES

Air advisory is also attractive as a proactive means to assist failing states before they become a greater threat to international peace and security. Air advisory is, therefore, consistent with a forward defence strategy of nipping potential problems in the bud. This is accomplished by managing or solving problems by helping nations build their in-house capabilities. As part of an integrated host-nation capacity-building effort, an air-advisory capability "can improve internal and regional security and stability and thus, create an environment for greater economic development."[18] In summary, air advisory is a viable RCAF air power option that the Canadian government can choose to contribute to a COIN campaign, a PSO in Africa or even to NATO's Partnership for Peace programme.[19]

By building up a host nation's air power capabilities and infrastructure, air advising offers an important swords-into-ploughshares advantage in support of overall Canadian government host-nation capacity-building efforts. For one, most air-advisory advocates emphasize the importance of developing both military and civil/commercial aviation capacity.[20] For another, the development of military aviation capabilities and facilities in a host nation has follow-on benefits for the development of general aviation infrastructure in the country. This is especially the case with a country with poor road and rail systems (a feature of a number of failed and failing states for which capacity building is needed), as it will have to rely on aviation to open up the country and to deliver goods and services.[21]

AIR POWER APPROACH

The two-pronged military-and-civil-aviation approach is premised on a wider definition of air power. RCAF capstone doctrine justifiably recognizes a more military-centric definition of air power: "that element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth."[22] However, one can also take a broader approach to air power by widening the definition to consist of "the full potential of a nation's air capability, in peace as well as war, in civilian as well as military pursuits."[23] Taking this definition into account, air advisory helps build air power capacity (aviation[24] skills and infrastructure) in a host nation.[25]

Capitalizing on the air power characteristics of reach and speed, such capacity can have important dividends for a host nation's economic development and political stabilization. This is best captured in a JAPCC study on air-advisory operations:

> A robust aviation enterprise can offer efficient and effective distribution of cargo and goods both within the country and to regional and global markets, improved access for government officials to remote areas of the country, and a transportation alternative to supplement the existing ground-based or waterborne infrastructure.[26]

Moreover, building air power in a host nation offers the prospect of employment—especially for the younger generation—and, thus, helps negate recruitment by insurgent organizations.[27]

SYSTEMIC EMPOWERMENT

Air advisory, thus, captures air power academic Col John Andreas Olsen's concept of "systemic empowerment." He advocates viewing a host nation as a system in which the air power strategy should be "to combine *systemic paralysis* (of the opponent) with *systemic empowerment* (of the supported ally) using both lethal and nonlethal means in support of *strategic effects*."[28] [emphasis in original] In this case, the focus of air power should not be on war fighting but war ending, wherein direct combat should be avoided unless absolutely necessary. An air-advisory approach of supporting and advising the host nation to ensure systemic empowerment should, thus, be the cornerstone of any NATO COIN strategy. Therefore, air advisory provides an important link between military power and statecraft, as it utilizes air power in support of an overall government policy of capacity building.[29]

By empowering the host nation, air advisory is essential in building that nation's legitimacy and reinforcing the coalition's credibility—key objectives of any capacity/state-building endeavour. If it is host-nation personnel who are carrying out air operations, be they kinetic or non-kinetic, there is less of a chance that an insurgent group can paint the coalition as imperialist foreign invaders and the host-nation government as a coalition puppet. This can undermine the insurgents and build trust between the coalition and host nation, thus reinforcing the optics of host-nation government and coalition partners as credible agents of positive change, thereby strengthening legitimacy.[30]

ENHANCED GOVERNMENT LEGITIMACY

Since one of the purposes of a nation's government is to provide services for its citizens, the air advisory's role in building military-and-civil-aviation infrastructure to serve the nation's people is a way to enhance government legitimacy. Air power's characteristics of reach and speed contribute to the ability of governments to exert their sovereign authority over their country by giving access to government officials (civilian, law enforcement and military) to the entirety of a host nation's territory. In addition to being able to provide

medical assistance, HADR, SAR, effective governance and security, air power also allows officials the ability to travel to remote areas. Doing so permits direct engagement with the population throughout the country "to establish intentions, direction, determination, and confidence; and conduct comprehensive security sector reforms involving the military, police, and intelligence"—all of which "contributes to the legitimacy of the supported [i.e., host nation] government."[31] Lastly, by carrying out air operations themselves, host-nation personnel can take pride accomplishing a mission for the good of their country, and doing so independently, which can contribute to a sense of national pride and unity.[32] These are clear beneficial strategic effects.

THE RCAF AND AIR POWER ADVISORY

As an air force that exercises the "indivisibility of air power," the RCAF is ideally suited to carry out an air-advisory role. Advocates for air advisory argue that trained and educated air-force personnel with a diversity of air power expertise are essential to ensure the success of a coalition air-advisory endeavour.[33] RCAF personnel possess and will continue to develop such diversity.[34] The RCAF already has a distinguished legacy of excellence in air training, and this can be imparted to host-nation personnel in other countries via air advisory. Additionally, with all military air power centralized under the RCAF, Canadian air-force personnel not only have expertise in a wide spectrum of air power effects but also may prove a useful template for host nations who, due to size and financial limitations, have to consolidate all of their air power under one service (i.e., vice having organic air power in the army, navy, etc.). In particular, RCAF expertise in fixed- and rotary-wing platforms could prove particularly valuable to a coalition air-advisory mission.[35] Moreover, with the recent RCAF initiatives to strengthen the RCAF Aerospace Warfare Centre as a centre of air power excellence and to inculcate professional air power mastery into its officers, RCAF air power expertise will only get better and, therefore, be of greater value to a coalition air-advisory mission. Lastly, the RCAF also has experience in participating in and commanding air-advisory missions. It has recently contributed to an advisory aviation-safety training mission in the Ukraine, and the former Aerospace Warfare Centre Commanding Officer (CO) Col Mike Dabros was deputy commander of the air-advisory Combined Air Power Transition Force in Afghanistan.[36]

An RCAF air-advisory contribution to a coalition endeavour could also be part of a larger Canadian WoG and comprehensive-approach effort towards capacity building in a host nation. This could include coordinating with government and non-government partners, such as Transport Canada, NAV Canada and the International Civil Aviation Organization.[37] The RCAF could, therefore, leverage and further strengthen its already-strong relationship with these organizations in a collaborative effort to export aviation expertise. It would also be directly in support of the RCAF's integrated vector.[38] Language is often a huge barrier that needs to be overcome to make air-advisory missions successful.[39] As a bilingual institution, CAF already has a robust language training programme, and this may be leveraged to help train host-nation air personnel in aviation matters.

An identifiable Canadian approach to air advisory may also prove beneficial to a coalition effort. For instance, then–Brigadier General Michael R. Boera, Commanding General of the Combined Air Power Transition Force in Afghanistan, explicitly noted that a traditional, more-patient approach of other NATO nations may help negate the "stereotypical US impatience" in an air-advisory mission.[40] Of vital importance is the fact that RCAF personnel will have to be cognizant of cultural practices and sensibilities in any air-advisory capacity. Trying to build an air force "in its own image"—i.e., applying a Western model—must be avoided because it is not compatible given the cultural differences of host states.[41] An approach that is appropriately tailored to the host nation must, therefore, be a paramount planning consideration, and this will require a particular focus on cultural understanding and an appreciation of unique cultural concerns and conditions.[42] It will also have to consider recent CAF initiatives such as Operation HONOUR and United Nations Security Council Resolution (UNSCR) 1325.[43] To enable cultural understanding and appreciation, RCAF personnel will require empathy;[44] therefore, incorporating design thinking into the RCAF's air-advisory approach may prove necessary.[45]

RCAF CONSIDERATIONS

Specific air-advisory training might be required for RCAF personnel to deploy on an air-advisory mission.[46] The RCAF may, therefore, want to consider sending personnel to USAF's Air Advisor Academy or having the academy's roadshow conduct courses for the RCAF.[47] As with an AAR niche, an RCAF air-advisory capability should also ensure adherence to standardized NATO practices, procedures, doctrine, etc. to ensure interoperability.[48]

An RCAF air-advisory role can supplement the good work that CAF's SOF community has done in Afghanistan and continues to do in Iraq, conducting capacity building. Although some would argue that air advisory should only be a SOF role, SOF forces have a finite number and cannot be everywhere at once.[49] Having RCAF personnel deploy on coalition air-advisory missions to supplement SOF capacity-building efforts is, therefore, useful—not to mention garnering more prestige and recognition for the RCAF as Canada's air power institution.

In summary, an RCAF air-advisory contribution to larger coalition air-advisory endeavours promises to be beneficial not only to the host nation but also to the contributing nation. Assistance that a country like Canada gives to a host nation today may result in basing rights for future campaigns and access to economic advantages in the country tomorrow.[50] Perhaps most importantly from an expeditionary-operations perspective, however, by plugging in and sharing the air-advisory burden, the RCAF stands to build important relationships with key allies and enable greater access, compatibility and interoperability.[51] An air-advisory role is consistent with the RCAF's integrated vector, as it permits Canada to make a significant coalition contribution and have a potentially large strategic effect. It is also consistent with Canadian security and defence policy.

NOTES

1. On the BCATP and NATO Air Training Plan, see F. J. Hatch, *The Aerodrome of Democracy: Canada and the British Commonwealth Air Training Plan, 1939–1945*, Monograph Series No. 1 (Ottawa: DND, Directorate of History, 1983); Rachel Lea Heide, "The Legacy of Canada's International Air Training Schemes: RFC Canada, The British Commonwealth Air Training Plan, and the NATO Air Training Plan," in *Proceedings of Canada's Air Force: A Global Perspective, 8th Annual Air Force Historical Conference* (Winnipeg, MB: Office of Air Force Heritage and History, 2002), 123–31; and Captain Mike Rafter, "Far From Home: Foreign Aircrew Training in Canada," in *Proceedings of the 6th Annual Air Force Historical Conference* (Winnipeg, MB: Office of Air Force Heritage and History, 2000), 159–70. Also see the BCATP commemorative issue of the *Royal Canadian Air Force Journal* 5, no. 2 (Spring 2016), accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2016-vol5-iss2-spring.page.

2. Thatcher, "Planning for Power," 86.

3. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 37.

4. Improving interoperability is also accomplished through liaison and the exchange of instructor pilots with other countries as part of the NFTC programme. Maj Brian Jeffs, "Canada's World Class Pilot Training," *Joint Air Power Competence Centre Journal*, no. 9 (2009): 26, 29, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-9/.

5. Jeffs, "Canada's World Class Pilot Training," 26–29.

6. Thatcher, "Planning for Power"; and Maj Ryan Kastrukoff, "Shifting Paradigms: Aerospace Simulation in the RCAF," *Royal Canadian Air Force Journal* 4, no. 1 (Winter 2015): 40–42, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2015-vol4-iss1-winter.page.

7. Canada, DND, "426 Transport Training Squadron," accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/8-wing/426-squadron.page; Richard Goette, "The RCAF's Uniquely Canadian Helicopters: 450 Squadron's Boeing CH-147 Chinooks," *Airforce Magazine* 39, no. 3 (2016): 29; and Richard Goette, "By Air to Battle: 450 Squadron's Tactical Aviation Contribution to Canadian Air Power," *Airforce Magazine* 39, no. 4 (2016): 58.

8. Jeffs, "Canada's World Class Pilot Training," 26.

9. Jeffs, "Canada's World Class Pilot Training," 28.

10. Jeffs, "Canada's World Class Pilot Training," 26. This Contracted Flying Training and Support programme is due to expire in 2027. According to BGen Phillip Garbutt (Ret'd), Director General of Air Force Development, a key RCAF priority is to transition it and the NFTC programme into "a new procurement strategy that will deliver a solution for all of our aircrew training: pilots, be they rotary wing, multi-engine or fighter; and air combat systems officers (ACSOs) and airborne electronic sensor operators (AESOPs)." Quoted in Thatcher, "Planning for Power," 86.

11. Thatcher, "Planning for Power"; and Canada, Innovation, Science and Economic Development Canada, "State of Canada's Aerospace Industry: 2016 Report," accessed September 18, 2016, http://www.ic.gc.ca/eic/site/ad-ad.nsf/eng/h_ad03964.html. Partnership with the Canadian aerospace industry is also consistent with the RCAF integrated vector. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 37–38.

12. Rafter, "Far From Home," 169.

13. Jeffs, "Canada's World Class Pilot Training," 29.

14. On the US air advisory programme, see Major General Timothy M. Zadalis, "The Air Advisor: The Face of US Air Force Engagement," *Air & Space Power Journal* 27, no. 4 (July–August 2013): 4–13, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1156451/volume-27-issue-4-jul-aug-2013/; and Nicole S. Finch and Peter A. Garretson, "Air Advising: A Critical Component of Joint Engagement," *Joint Force Quarterly*, no. 70 (3rd Quarter 2013): 34–39, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-70/.

15. Col Bernie "Jeep" Willi, "Shoulder to Shoulder: The Need to Cultivate an Air Advisor Capability within NATO," *Joint Air Power Competence Centre Journal*, no. 17 (Spring/Summer 2013): 10–14, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-17/; Col John Andreas Olsen, "The Quest for a New Airpower Strategy: Systemic Paralysis and Systemic Empowerment," *Air & Space Power Journal* 29, no. 3 (May–June 2015): 31, 39, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1153175/volume-29-issue-3-may-jun-2015/; Group Captain Adrian Hill, "Advance of the Afghan Air Force," *Joint Air Power Competence Centre Journal*, no. 13 (2011): 14, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-13/; NATO, JAPCC, "Improving NATO Support to Future Air Advisor Operations," White Paper (Kalkar, Germany: JAPCC, April 2014), accessed May 3, 2018, https://www.japcc.org/portfolio/improving-nato-support-to-future-air-advisor-operations/; and Brigadier General Michael R. Boera, "Building Air Power for Afghanistan: A Team Effort," *Canadian Air Force Journal* 3, no. 1 (Winter 2010): 10, 11, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/archives.page. In addition to the many benefits to the host nation, one study notes the advantages in operating in a NATO construct: "an alliance to support the mission allows each participating NATO nation to bring its own experiences, backgrounds and perspectives to the mission. This allows the NATO partners to learn from each other and share their positive as well as negative experiences and utilize best practices from participating nations. Multinational operations provide a variety of perspectives, equipment, and experience in a culturally diverse group. This can bring more information, resources and ideas to accomplish the mission." NATO, JAPCC, "Improving NATO Support," 17.

16. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 94.

17. Kevin D. Stringer, "The Missing Lever: A Joint Military Advisory Command for Partner-Nation Engagement," *Joint Force Quarterly*, no. 81 (4th Quarter 2016): 86, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-81/; and Aaron Tucker and Aimal Pacha Sayedi, "Advising the Afghan Air Force," *Joint Force Quarterly*, no. 80 (1st Quarter 2016): 18, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-80/.

18. NATO, JAPCC, "Improving NATO Support," 4.

19. Zadalis, "Air Advisor," 5. In fact, NATO has utilized air advisors in previous Partnership for Peace initiatives. Olsen, "Quest for a New Airpower Strategy," 36; and Willi, "Shoulder to Shoulder," 12.

20. Olsen, "Quest for a New Airpower Strategy," 36; Boera, "Building Air Power for Afghanistan," 15; and NATO, JAPCC, "Improving NATO Support," 9.

21. NATO, JAPCC, "Improving NATO Support," 6, 9, 12; and Boera, "Building Air Power for Afghanistan," 15.

22. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 1.

23. David MacIsaac, "Voices from the Central Blue: The Air Power Theorists," in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton: Princeton University Press, 1986), 627, note 6.

24. The term "aviation" used in this study refers to the generic term related to the pursuit of flying. The term "tactical aviation" or "rotary-wing aviation" will, therefore, be used to refer to the term "aviation" usually found in army doctrine.

25. Olsen, "Quest for a New Airpower Strategy," 31.

26. NATO, JAPCC, "Improving NATO Support," 12. See also Boera, "Building Air Power for Afghanistan," 11; and Tucker and Sayedi, "Advising the Afghan Air Force," 20–21. The point about ground transportation challenges is important to highlight, as it runs the risk of improvised explosive devices (IEDs) being placed on roads by insurgents. Indeed, countering these devices was one of the main justifications for deploying RCAF tactical aviation assets to Afghanistan, as air mobile assets helped negate the effectiveness of IEDs.

27. Boera, "Building Air Power for Afghanistan," 15.

28. Olsen, "Quest for a New Airpower Strategy," 30.

29. Olsen, "Quest for a New Airpower Strategy," 31, 33, 36.

30. Olsen, "Quest for a New Airpower Strategy," 33; Tucker and Sayedi, "Advising the Afghan Air Force," 18, 20; NATO, JAPCC, "Improving NATO Support," 23; Finch and Garretson, "Air Advising," 36; and Hill, "Advance of the Afghan Air Force," 10–11.

31. Olsen, "Quest for a New Airpower Strategy," 30, 36; NATO, JAPCC, "Improving NATO Support," 12, 17; Boera, "Building Air Power for Afghanistan," 12, 18; Zadalis, "Air Advisor," 8; and Hill, "Advance of the Afghan Air Force," 10–11. Quote from Olsen, "Quest for a New Airpower Strategy," 36.

32. NATO, JAPCC, "Improving NATO Support," 12.

33. NATO, JAPCC, "Improving NATO Support," 5, 19, 26; Boera, "Building Air Power for Afghanistan," 9; Zadalis, "Air Advisor," 11; Finch and Garretson, "Air Advising," 36–37; and Willi, "Shoulder to Shoulder," 12.

34. Various potential air-advisory roles based on RCAF personnel experience could include, but are not limited to, in-cockpit training and mentorship of host-nation aircrew; air base services mentorship; opening and operating air bases; establishing airspace management, command and control as well as communication structures/architectures throughout the host nation; establishing logistics and supply systems; SAR; aircraft maintenance; humanitarian operations; theatre airlift; battlefield mobility; airfield management; air engineering. NATO, JAPCC, "Improving NATO Support," 9, 14; Boera, "Building Air Power for Afghanistan," 9, 12; Finch and Garretson, "Air Advising," 37; Willi, "Shoulder to Shoulder," 12; and Hill, "Advance of the Afghan Air Force," 11.

35. NATO, JAPCC, "Improving NATO Support," 23–24; and Boera, "Building Air Power for Afghanistan," 11.

36. RCAF Directorate of Air Safety, "RCAF Takes Aviation Safety Training to Ukrainian Armed Forces," *Airforce Magazine* 40, no. 2 (2016): 6–7; and Boera, "Building Air Power for Afghanistan," 9.

37. On the incorporation of air advisory into a WoG/comprehensive-approach effort, see NATO, JAPCC, "Improving NATO Support," 17; Zadalis, "Air Advisor," 5; and Finch and Garretson, "Air Advising," 35.

38. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 37–38.

39. It is noted particularly that English is the international language of aviation. NATO, JAPCC, "Improving NATO Support," 17–18; Boera, "Building Air Power for Afghanistan," 16; and Zadalis, "Air Advisor," 8.

40. Boera, "Building Air Power for Afghanistan," 13.

41. Olsen, "Quest for a New Airpower Strategy," 31; RAF Group Captain Michael Leaming noted specifically that in Iraq "the task at hand was to re-establish the Iraqi Armed Forces (Army, Navy, Air Force and Special Operations Forces) along Western Democratic Lines." Group Captain Michael Leaming, "Building an Iraqi Air Force," *Joint Air Power Competence Centre Journal*, no. 6 (2007): 14, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-6/. It could be argued that one of the failures in Iraq was the tendency to impose a Western model that was not compatible with Iraqi military culture. Author's conversations with American officers at CFC.

42. Olsen, "Quest for a New Airpower Strategy," 35; NATO, JAPCC, "Improving NATO Support," 13, 24; Boera, "Building Air Power for Afghanistan," 12, 18; Zadalis, "Air Advisor," 8, 11; Finch and Garretson, "Air Advising," 36, 38; and Tucker and Sayedi, "Advising the Afghan Air Force," 19–20.

43. "CDS Op Order – Op HONOUR," 14 August 2015, accessed May 3, 2018, http://www.forces.gc.ca/en/caf-community-support-services/cds-operation-order-op-honour.page; and Canada, DND, "CDS Directive for Integrating UNSCR 1325 and Related Resolutions into CAF Planning and Operations," 29, January 2016, accessed May 3, 2018, http://www.forces.gc.ca/en/operations-how/cds-directive.page.

44. On the need for empathy in air advising, see Finch and Garretson, "Air Advising," 36.

45. On Design Theory see Col Stefan Banach and Alex Ryan, "The Art of Design: A Design Methodology," *Military Review* (March–April 2009): 105–115, accessed May 3, 2018, http://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/2009-Archive/#marapr; Lieutenant Colonel Celestino Perez Jr, "A Practical Guide to Design: A Way to Think About It, and a Way to Do It," *Military Review* (March–April 2011): 41–51, accessed May 3, 2018, http://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/2011-Archive/#marapr; and Ben Zweibelson, "One Piece at a Time: Why Linear Planning and Institutionalisms Promote Military Campaign Failures," *Defence Studies* 15, no. 4 (2015): 360–74.

46. NATO, JAPCC, "Improving NATO Support," 5, 26.

47. Zadalis, "Air Advisor," 6, 11; Finch and Garretson, "Air Advising," 36; NATO, JAPCC, "Improving NATO Support," 24–25; and Tucker and Sayedi, "Advising the Afghan Air Force," 17.

48. NATO, JAPCC, "Improving NATO Support," 28; and Zadalis, "Air Advisor," 11.

49. Finch and Garretson, "Air Advising," 36.

50. NATO, JAPCC, "Improving NATO Support," 11.

51. Zadalis, "Air Advisor," 10; and Finch and Garretson, "Air Advising," 35. Finch and Garretson, in particular, remark that allied burden sharing contributions to American air-advisory efforts will grant them "global access to the U.S. joint force." Finch and Garretson, "Air Advising," 34.

6
Personnel

INTRODUCTION

The RCAF's greatest resource is its people.[1] Their training, skill, experience and education can be leveraged as a niche contribution to coalition expeditionary endeavours. Contributing competent personnel on expeditionary operations is arguably part of the "Canadian military way," as there is a strong historical precedent for Canadian personnel. This is best captured by *Future Security Environment 2013–2040*:

> CAF has primarily gained influence on expeditionary operations through the provision of competent staff to coalition and alliance command structures and the fielding of credible, highly skilled forces. Such means have allowed for Canadian national interests to be better served and for Canada to often have an influencing role during coalition planning processes. This has meant striving to develop, generate, and deploy forces that are mobile and interoperable.[2]

The RCAF, in particular, has historically produced high-quality personnel that allies value for their professionalism and skill, whether operating in the field, in joint headquarters or in combined air operations centres (CAOCs), allowing Canada to "punch above its weight."[3] If the Canadian government is weary of contributing air platforms for any campaign, kinetic or otherwise, one niche that the RCAF could focus on as a coalition contribution is personnel.[4] This is an existing capability that could possibly be enhanced by a greater focus on the production of personnel—especially staff officers. The current RCAF effort to improve its PME with the Air and Space Power Operations Course (ASPOC) hints towards the RCAF's growing capability in enhancing its staff-officer capabilities.

The RCAF can, therefore, make an essential contribution by continuing its traditional practice of producing high-quality personnel/staff to fill key roles in various coalition constructs.[5] However, in doing so, the complexities of modern, diverse operations on the entire spectrum of conflict require that the RCAF not be satisfied with the status quo

of its personnel, lest this allow complacency to set in. It should, therefore, continuously strive to build on the capabilities of its personnel through professional-development initiatives.[6]

INTELLECTUAL AGILITY

Put differently, the RCAF will need to increase its investment in its personnel to ensure it remains a professional air power institution. It is necessary to ensure that personnel have the intellectual agility and creativity they need to take on the challenges of effectively utilizing the RCAF's scarce resources and ensuring that the RCAF is interoperable with partners in modern operations. Outside-the-box thinking as well as the intelligent and professional application of judgement are essential for comprehending and successfully operating along the entire spectrum of conflict in today's complex security and defence environment. This necessitates that the RCAF leverages the intellectual-capital potential of its personnel.[7] Intellectual agility—empowered by critical thinking, debate and analytical skills—needs to be optimized to challenge assumptions, enable strategic thinking within the RCAF as well as allow it to adapt rapidly to emerging and dynamic situations.[8]

Such intellectual agility and creative thinking is especially needed in this fiscal- and resource-restrained time to maximize air power effects to benefit Canada, Canadians and the RCAF as a professional military institution. Air power is always in demand, but there is a limited amount of it in Canada to go around. This necessitates intellectual agility and creativity to ensure "the most appropriate, effective and efficient way to generate and employ air power" to provide a proper balance between fulfilling first-principle RCAF responsibilities and contributing to allies on expeditionary operations.[9] Doing so will help safeguard national security and promote national interests.[10]

It is, therefore, essential to develop intellectual agility throughout the career of RCAF personnel, as it enables greater adaptability, creativity and innovativeness. Constant studying throughout a career fosters intellectual agility and "develops and shapes critical-thinking skills while providing the essential contextual understanding needed to confront current airpower and warfighting problems."[11] To do so necessitates not only technical air power mastery—the technical expertise and practical application of air power—to deal with complicated problems but also professional air power mastery—intellectual or conceptual aspects of air power—to address complex problems. Technical mastery of aerospace systems is part of the unique expertise of air-force personnel. Indeed, the RCAF has a proud history of technical air power mastery learned from first-rate training and operational experience, which consists of two of the four pillars of CAF professional development. Nevertheless, the RCAF needs to build on its technical excellence and do a better job of fostering intellectual professional air power mastery, which is based on the self-learning and, especially, education pillars of CAF professional development and emphasizes intellectual air power knowledge.[12] Successfully pursuing both these pillars,

however, has proven to be a challenge for the RCAF. A historical feature of Canada's air force is that it is very operations focused and, especially in recent years, has had a very high operational tempo. High demands on air-force equipment and personnel have allowed RCAF personnel to capitalize on the experience and, to a degree, training pillars of professional development, but limited time availability has not allowed them to capitalize on education and self-learning.[13]

PROFESSIONAL DEVELOPMENT

There is currently a requirement in the RCAF to go beyond the technical or tactical level of air power mastery to address pressing operational, organizational and strategic issues that face the RCAF as an air power institution. Fostering an innovative, adaptive and learning institution by focusing on education as a tool to enhance professional competence and mastery is essential if the RCAF is to get past its tactical focus and get a leg up on the operational and strategic levels.[14] The key is distinguishing between training and education.

While training teaches mechanical reactions to predictable situations, education imparts the analytical skills that enable personnel to reason through unpredictable and complex situations and ensure that air power is properly harnessed and leveraged.[15] Therefore, to enable professional air power mastery in the RCAF requires a professional-development system that supports a comprehensive understanding of the nature and theory of air power and its effective application. In other words, developing the conceptual component—the theoretical underpinning of air power—is essential. To develop intellectually agile RCAF personnel requires that they think about air power writ large. This entails moving beyond characteristics, platforms and operational communities and, instead, emphasizing comprehension of the guiding principles as well as thinking about the conceptual application and utility (strengths but also weaknesses) of air power. This means critically analysing air power—its theory of practice and its history—to comprehend long-term trends in warfighting as well as appreciate the essential explanations for success and failure. This is necessary to comprehend air power's utility and optimal employment so that RCAF personnel can articulate this to their partners (joint, combined and interagency) and political masters.[16] As Rear-Admiral (RAdm) Darren Hawco, CAF Chief of Force Development, remarked at the 2016 Air Power Symposium, "the RCAF needs to be the SME of air power."[17]

PROFESSIONAL AIR POWER MASTERY

Professional air power mastery speaks to the "depth" aspect of Kainikara's smaller-air-force concept. It entails the requirement to have not only a balanced force of capabilities (depth as it relates to the size of the force and ability to sustain it in operations) but also sufficient intellectual and institutional depth of professional mastery to ensure that an air

force can sustain its cognitive capacity and competence to harness, adapt and maximize the air power effects of these limited (i.e., in quantity) resources to fulfil first-principle responsibilities and contribute to expeditionary coalition operations today and in the future.[18] It also includes the capacity and competence of smaller air forces, like the RCAF, to "institute rigorous procedures to evaluate and ascertain their actual operational competency at frequent intervals" to avoid what Kainikara terms as "force overstretch": "a condition wherein the entire force suffers from a gradual, and normally unnoticed, decline in its overall operational capability."[19] Arguably, the RCAF has experienced force overstretch in recent years. This has included the high operational tempo of 2010 when the RCAF was carrying out a variety of domestic and international operations as well as the early 2000s when a very high tempo combined with limited capability capacity caused the RCAF Chief of the Air Staff at the time, LGen Ken Pennie, to remark that Canada's air force is "beyond the point where even constant dedication is sufficient to sustain the capabilities needed to meet assigned Defence tasks … [and] remains fragile due to chronic underfunding and asymmetric cuts to personnel. Our Wings and Squadrons are too hollow to sustain the current tempo of operations."[20] Such a situation must be avoided, thus necessitating greater agility of RCAF personnel.

As Canada's air power experts, RCAF personnel have a responsibility to be the stewards of air power in Canada.[21] Enhancing the RCAF's knowledge—its mastery of intellectual air power—is, therefore, something that benefits not only individual RCAF aviators and airwomen (the people who are the air force's most valuable resources) but also the RCAF as a whole as an air power institution. The RCAF is currently implementing measures in the form of educational initiatives, such as a master's level expertise in Canadian air power through the Royal Military College of Canada and enhanced Development Period 2 education in the form of the new ASPOC at the RCAF Aerospace Warfare Centre in Trenton. In addition to professional air power mastery that will inculcate a comprehensive understanding of Canadian air power, ASPOC will ensure that well-educated officers will have greater operational-planning capabilities through a more thorough grasp of the operational planning process (OPP) and the employment of air-task-force concepts. Greater emphasis on C2, staff skills as well as joint and combined planning will also improve CAOC capabilities and ensure greater RCAF involvement in—and command opportunities for—expeditionary operations.[22]

COMMAND AND CONTROL

Focusing on enhancing the intellectual agility of RCAF personnel will also be an advantage, given the requirement to be adaptable to changing expeditionary C2 structures. A flexible C2 culture is essential in modern coalition campaigns, as interoperability with joint partners and allies demands that the RCAF be capable of integrating into various Royal Canadian Navy (RCN), Canadian Army (CA), American, NATO and other coalition constructs.[23] Flexible C2 structures also demand intellectual agility to ensure that RCAF officers reflect Canadian values, the rule of law, the LOAC and ethical

behaviour, which includes adherence to Operation HONOUR and the Chief of the Defence Staff's (CDS's) UNSCR 1325 initiative.[24] RCAF staff officers will especially need to be flexible in dealing with unpredictable situations in a combined expeditionary construct. These requirements all emphasize the importance of "human" factor/element aspects of strong interpersonal competencies and interaction (i.e., the attributes of "trust, respect, perceptiveness and empathy that promote effective teamwork"[25] and building solid working relationships) with one's subordinates, superiors and allies is essential.[26] This is borne out by LGen Charlie Bouchard's advice "on the key to successful NATO operations, such as OUP: 'When working within a complex alliance … it's important to "play nice with all others in the playground [and] share your toys."'"[27]

PERSONNEL ATTRIBUTES

Enhanced RCAF personnel intellectual agility will also require competencies in humility as well as cultural awareness, understanding and sensitivity. These attributes will be particularly necessary when operating with a diverse range of global partners in coalitions (especially on PSOs) to foster effective working relationships with non-traditional allies. Furthermore, empathy of other cultures and situational awareness of the possible locations that the RCAF could deploy to on expeditionary operations will be required.[28] Even though some differences can be avoided in formal military alliances (such as NATO where there is greater standardization of equipment, doctrine and approaches to operations),[29] it is more difficult in coalitions consisting of nations with greater cultural differences. Martha Maurer's observations on C2 in this regard are illustrative:

> any coalition can be overlaid with regional variations of politics, ethnic and cultural values, and religious influences. These differences may extend into the command and control arena. Different philosophies of life or world view (Western, Asian, Arab) may influence national theories of command and control and, therefore of military doctrine.[30]

The cultural differences of OGDs and non-governmental organizations (NGOs) in today's comprehensive-approach and JIMP environments are even more complex, thereby putting a greater primacy on RCAF personnel's cultural understanding.[31]

OPERATING IN AN A2/AD ENVIRONMENT

Intellectual agility will also be necessary in the contested environment of A2/AD situations. Being adaptable to changing C2 structures is especially vital, as it is highly likely that delegated and distributed C2 will be required. Adversaries will use various means (i.e., conventional physical destruction, cyber, jamming, etc.) to target one's communications capabilities to introduce Clausewitzian friction and fog of war by disrupting or degrading friendly C2 and situational awareness.[32] Part of addressing this problem is to have a robust cyber mission-assurance programme to provide force-

protection capabilities for deployed forces.[33] However, it will also be necessary to plan for the eventuality that not all cyber countermeasures will be successful. A technical measure to help negate this challenge could be to incorporate redundancies into RCAF capabilities by maintaining legacy technology and communications systems that are not prone to cyberattacks.[34] Nonetheless, these too may be prone to disruption and degradation (i.e., electronic warfare), thereby negating their effectiveness. Therefore, in addition to such technical measures to defend against cyberattacks, it will be important to invest in the cognitive capabilities of personnel.

Greater intellectual agility and flexibility of RCAF personnel will be needed to empower them to operate and thrive in a degraded environment. It will necessitate increased emphasis on mission command in which operators act independently based on an understanding of the commander's intent before sortieing.[35] This is best captured by Mark Fitzgerald:

> In the future battlespace, the AOC [air operations centre—i.e., CAOC] will provide a continuous flow of resources into the fight and *shift* the battle management tasks forward. Providing on-scene aircrew/systems with "mission-oriented orders" and trusting them to implement solutions and adapt as conditions evolve may be less efficient than the highly controlled operations we have conducted over the past two decades against weak opponents. But delegating these tasks forward will require far less real-time, long-range communication and is therefore more robust against enemy network attacks.[36] [emphasis in original]

The Commander of USAF's Air Combatant Command, General Gilmary Michael Hostage III puts the A2/AD C2 challenge succinctly: "resilient command and control (C2) in an A2/AD environment will require *centralized command, distributed control, and decentralized execution*."[37] [emphasis in original]

RECENT EXPERIENCES

Experiences in recent air campaigns in which the operational environment has largely been uncontested have resulted in some practices and tendencies that will be dangerous in an A2/AD environment. During recent COIN operations, for instance, an over-reliance on air power has led to a degrading of centralized control and decentralized execution. The result is the use of air power has become less operationally flexible and too tactical, resulting in a "reactive approach [that] can quickly devolve into a game of 'whack a mole,' which can cause commanders to neglect other important lines of operation and lose focus on the strategic end state."[38] In addition, due to the uncertainty of expeditionary operations and the inherent political risks of issues such as collateral damage, commanders have become increasingly desirous of exercising greater centralized control over air assets. However, although such micromanagement gives the commander greater certainty, it stifles initiative and undermines the authority of subordinate commanders.[39]

Other dangerous practices and tendencies have included the development of a generation of air-force personnel who have had the luxury of, and have become accustomed to, leveraging a secure and robust C2 system. It also includes greater CAOC reach-in—the "long screwdriver"[40]—for the conduct of air operations which has "muted some Airmen's instincts for independent operations."[41] Such developments are doctrinally undesirable (they are contrary to the fundamental air power tenet of centralized control and decentralized execution), and the amalgamation of complacent over-reliance on a secure C2 infrastructure and "tactical generalship" combine to undermine the authority of subordinate commanders.[42] Moreover, such a C2 construct will not be possible in a contested A2/AD environment.

The key to operating in an A2/AD scenario will be C2 flexibility and empowering subordinates through mission command. Commanders will need to place trust in the intellectual agility of their personnel and enable them to carry out the mission. This is best captured by Hostage's observations about the importance of the human element capabilities embodied in air-force personnel ("Airmen" in the USAF lexicon) to ensure C2 in an A2/AD environment:

> Airmen are the ultimate source of our combat capability. They possess the knowledge, creativity, and drive to overcome highly complex and dynamic challenges whenever and wherever the Nation asks. They are possessed of a unique air-mindedness. They are creative, highly adaptive, and capable of rapidly making bold decisions. They are our most precious resource and *the* critical element of successful distributed control. The trust shared by Airmen underpins the process of distributed control; without trust, distributed control fails. Trusted autonomy allows Airmen to act with initiative knowing the decisions they make and the actions they take will be supported by the commanders who have placed their trust in them. The expectation that Airmen are empowered to operate with trusted autonomy is who we are and how we fight.[43] [emphasis in original]

The greater focus on mission command is ideal for the RCAF because centralized control and decentralized execution is a key Canadian-air-force doctrinal air power tenet.[44]

INTEGRATION AND INTEROPERABILITY

The capability to adapt to a delegated and distributed C2 coalition construct will be particularly essential for the RCAF if it desires to plug into US-led coalitions. As Gladman has noted, "key allies must keep pace with the evolution of USAF and US military command and control to ensure their seamless integration into a coalition. That integration, and the effective capabilities they provide, will ensure them a place at the table when determining coalition desired end-states and strategies."[45] It, therefore, also behoves the RCAF to improve the intellectual agility of its personnel through professional

air power mastery to ensure opportunities for its personnel to operate alongside USAF. The RCAF should maintain and even enhance its joint-combined interoperability with the US armed forces because the continuous maturation of institutional ties will help ensure the seamless interaction of Canadian and American air forces.[46]

Interoperability is essential for expeditionary operations. As Thierry Gongora has noted, "the most deployable force will not be considered by a coalition if once deployed it cannot operate effectively with other members due to language or doctrinal barriers, or incompatibility in equipment and supplies."[47] The RCAF should, therefore, increase the exposure of its personnel to USAF and potential coalition partners (and conversely, them to the RCAF) through additional training, liaison and engagement with allied centres of excellence such as NATO's JAPCC. Such exposure will not only develop trust and strong working relationships with partners (and thus avoid potential problems) but also allow the RCAF to develop a cadre of trained personnel with expertise in expeditionary operations that can be called upon when Canada deploys on a coalition mission.[48]

Maintaining or even achieving greater levels of integration by working hand-in-hand with USAF will build trust and familiarity that could potentially pay huge dividends for the RCAF. Partnership with the US in expeditionary operations may lead to favourable Canadian staff positions (i.e., in CAOCs) and possibly even operational-command opportunities for RCAF personnel.[49] The RCAF should, therefore, enhance its NORAD connection with USAF and safeguard its special role as a key integrated partner in this binational command organization.[50] The RCAF should also continue to expand beyond the NORAD link by making connections with USAF in other areas by seeking greater involvement (i.e., planning and staff positions) in exercises and expeditionary operations to enhance interoperability and develop mature working relationships.[51] Lastly, the RCAF should ensure that it sends the right number and appropriate type of personnel in terms of capability and experience but also sufficient rank to fill positions in the right places. This will ensure that the RCAF (and by extension Canada) is able to get full value and recognition for its contribution to coalition exercises and expeditionary operations.[52]

RECOMMENDATION

Maintaining close links to USAF, such as the NORAD one, has proven to be very advantageous to the RCAF, both historically and more recently. Arguably it is because of this connection that the US had trust in LGen Bouchard's ability to be the operational commander for OUP. This is captured well by Mayne:

> The transition from Odyssey Dawn was even more significant for Canada because a Canadian commanded Unified Protector. Lieutenant-General Charles Bouchard was considered a good choice to head the NATO mission; Canada's Minister of National Defence described him as a "formidable leader, with tremendous character and ability." Having served as the deputy

> commander of Allied Joint Force Command [JFC] in Naples since 2009, Bouchard was familiar with the area and had much experience in NATO and coalition environments. As a result, the transition from U.S. Admiral Samuel J. Locklear (who was the commander, Allied Joint Force Command Naples, and responsible for Odyssey Dawn) to Lieutenant-General Bouchard represented a natural progression. Moreover, Lieutenant-General Bouchard immediately put his NATO experience to good use. When summoned to Admiral Locklear's command ship (the *USS* [United States Ship] *Mount Whitney*) and effectively given seven days to establish a Combined Joint Task Force HQ [headquarters] within the constraints of JFC Naples, Bouchard was able to quickly pick much of OUP's leadership team from the officers who had previously helped him prepare the NATO Reaction Force.[53]

Although it is by no means guaranteed, continuing and enhancing the RCAF's connection with USAF may permit Canada's air force to leverage its connections with the US to have more operational-command opportunities in the future, especially as the US desires its allies to take on larger roles in modern expeditionary air campaigns. Such "favourable conditions for command expression"[54] would include placing RCAF personnel within coalition operational- and strategic-level HQ to develop experienced leaders and potential operational commanders for future expeditionary operations. It would be consistent with RCAF Commander LGen Hood's previous writing on the subject about the need for programmes to develop RCAF commanders for employment at the operational and strategic levels.[55]

Lastly, it bears mentioning that no matter how skilled one's personnel are, or how much of an impact they can have on coalition staffs and CAOCs, their contribution alone is not enough for modern coalition operations across the spectrum of conflict. Although allies value RCAF staff officers for their skills and professionalism, these same allies may be reluctant to allocate valuable (and oftentimes internationally—and competitively—sought-after) staff positions in joint headquarters and CAOCs to RCAF officers. Such reluctance is only enhanced if Canada is unwilling to contribute other air assets as part of a coalition effort. If the RCAF wants to secure a seat at the console at the joint headquarters or CAOC, it should contribute not only agile personnel "human" resources but also sufficient materiel and platforms.[56] To utilize LGen Bouchard's analogy, the RCAF will not only need to supply personnel but also bring its toys and share them with allies if it wants to play in the sandbox.

NOTES

1. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 32, 43; and "Royal Canadian Air Force and NATO," 20. As RAAF air power academic Sanu Kainikara (who spoke at the 2014 RCAF Air Power Symposium) put it, "the core of all military forces is its people. Air Force considers its members to be its primary asset. This assertion needs explaining mainly because there is a widely held belief that air forces are heavily dependent on technology almost to the exclusion of the human element. The fact is that while air forces are technologically dependent, their employment—in terms of strategy, concepts and tactics as well as the conduct of actual operations—is always decided and directed by human beings. People are central to air forces." Kainikara, "Professional Mastery and Air Power," 49.

2. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 87.

3. The following example from Op MOBILE—one of many—is illustrative: "In the end, the Canadian Air Component HQ's quick deployment and attainment of full operational capability as well as its integration into the NATO CAOC went extremely well—so well, in fact, that one senior Canadian officer observed that it 'demonstrated the ability of the RCAF to quickly and seamlessly integrate into a multi-national coalition command structure, enabling near immediate employment of RCAF aircraft in the conduct and support of combat operations.'" Mayne, "Canadian Experience," 254. Mayne is quoting 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 2. Notably, Joyce concludes his report by noting that "Canada's reputation for hard work and dedication to the mission has been further cemented in the eyes of the NATO partners and will serve to solidify their lasting respect." 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 8.

4. There is seemingly always a need for skilled personnel in coalition warfare. For instance, remarking on the set-up of OUP, Col Todd Phinney noted specifically the "immediate lack of skilled staffing across each of the CFAC [Combined Force Air Component] divisions." Todd R. Phinney, "Reflections on Operation Unified Protector," *Joint Force Quarterly*, no. 73 (2nd Quarter 2014): 87, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-73/.

5. "Royal Canadian Air Force and NATO," 18.

6. Goette, "Command and Control Implications," 75–76; and Dr. Brad Gladman et al., "Professional Airpower Mastery and the Royal Canadian Air Force: Rethinking Airpower Education and Professional Development," *Royal Canadian Air Force Journal* 5, no. 1 (Winter 2016), accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2016-vol5-iss1-winter.page; and Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 31–32.

7. Canada, DND, A-PA-005-001/AP-001, *Duty With Honour: The Profession of Arms in Canada* (Kingston: Canadian Forces Leadership Institute, 2009), 17–18, 51, 65, 78; Canada, DND, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution* (Kingston: Canadian Defence Academy – Canadian Forces Leadership Institute, 2007), 7; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 30–32, 43–44; "Royal Canadian Air Force and NATO," 19; and Gladman et al., "Professional Airpower Mastery," 10–11, 16. Op MOBILE provides a good example. Richard Mayne noted that "the value of innovative thinking and rapidly adapting to circumstances to produce either new capabilities or strategic effects was a common characteristic that should be repeated and specifically fostered during future missions." Mayne, "Canadian Experience," 264.

8. Canada, DND, A-PA-005-001/AP-001, *Duty With Honour*, 59; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 23, 34; and Canada, DND, *FAOC*, 23. Such skills are also essential in operating in an A2/AD environment, which requires "operators who can think through and solve complex problems with many possible solutions using an array of tools from a diverse skill set." Ballard et al., "Operationalizing Air-Sea Battle," 40.

9. Kainikara, "Professional Mastery and Air Power," 49.

10. Kainikara, "Professional Mastery and Air Power," 47, 49; and Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 31.

11. Canada, DND, A-PA-005-000/AP-006, *Leadership in the Canadian Forces*, 13; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 43; and Kainikara, "Professional Mastery and Air Power," 59. Quote from Gladman et al., "Professional Airpower Mastery," 18.

12. Kainikara, "Professional Mastery and Air Power," 48–49, 60; "Royal Canadian Air Force and NATO," 20; Kainikara, "Future Relevance of Smaller Air Forces," 12–13; Goette, "Command and Control Implications," 75–76; Gladman et al., "Professional Airpower Mastery," 10–12; and LCol Clay Rook, "Airpower Mastery: Is the RCAF at Risk of Professional Decay and Irrelevance?" (command issue essay, CFC, 2016). On the four CAF professional-development pillars, see Canada, DND, A-PA-005-001/AP-001, *Duty With Honour*, 18. Air power knowledge entails not only a holistic understanding of air power theory and capabilities but also its historical application: "In order to achieve professional mastery at the appropriate level, it is critical to understand the correct balance between knowledge and experience as well as cultivate the ability to employ air power based on past experience." Kainikara, "Professional Mastery and Air Power," 50. *Air Force Vectors* gives specific recognition to the importance of air power history. Building on this, the RCAF should mandate focused study of Canadian historical air power experiences—the study of Canada's air force as an air power institution. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 39.

13. André Deschamps, "Into the 21st Century – An Overview of Canada's Air Force in 2010," *Canadian Military Journal* 10, no. 4 (Autumn 2010): 63, accessed May 3, 2018, http://www.journal.forces.gc.ca/vol10/no4/index-eng.asp; Goette, "Command and Control Implications," 76; and Gladman et al., "Professional Airpower Mastery," 15, 18. Related to tempo is also the fact that the RCAF is (partially due to aviation-safety requirements) the environment tasked with the highest readiness. As LGen Hood remarked in his testimony before the House of Commons Standing Committee on National Defence, RCAF "air power capabilities must be available to the government whenever needed, on a daily basis, 24 hours a day, 365 days a year. It is the readiness of our people, their education, training, and commitment, that makes this happen." Canada, House of Commons, Standing Committee on National Defence, "Evidence," 1, 3.

14. Kainikara, "Future Relevance of Smaller Air Forces," 7, 10; Canada, DND, A-PA-005-001/AP-001, *Duty With Honour*, 68; Gladman et al., "Professional Airpower Mastery," 18; and Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 32, 34–35. LCol Rook makes the interesting—and valid—observation that some RCAF officers are able to achieve professional air power mastery "on an individual basis," largely through "personal drive" (i.e., the self-learning pillar of CAF professional development) but that there is still a pressing requirement for *institution-wide* RCAF professional air power mastery of all personnel. Rook, "Airpower Mastery," 16–17.

15. Canada, DND, Defence and Administrative Order 5031-8, Canadian Forces Professional Development, accessed May 3, 2018, http://www.forces.gc.ca/en/about-policies-standards-defence-admin-orders-directives-5000/5031-8.page; Goette, "Command and Control Implications," 76; Kainikara, "Professional Mastery and Air Power," 56–57; and Rook, "Airpower Mastery," 14–15.

16. Kainikara, "Professional Mastery and Air Power," 56–57, 60; Col John Andreas Olsen, "A New Concept for the Application of Airpower" (presentation, "The Transformation of European Airpower: Lessons for the Royal Danish Air Force" conference, Centre for Military Studies, The Kastellet, Copenhagen, Denmark, November 12–13, 2014); and Gladman et al., "Professional Airpower Mastery," 10, 17–18. This initiative is also consistent with *Air Force Vectors*, which states that the RCAF "must develop leaders with broad airpower knowledge who are capable of ACC functions within the construct of a deployed composite wing." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 22.

17. RAdm Darren Hawco (presentation, Air Power Symposium 2016, 31 March – 1 April 2016, 4–5). With permission.

18. Kainikara, "Future Relevance of Smaller Air Forces," 2–4, 10, 12; and Gladman et al., "Professional Airpower Mastery," 17–18.

19. Kainikara, "Future Relevance of Smaller Air Forces," 9.

20. Heide, "Canadian Air Operations," 79–80; and Deschamps, "Into the 21st Century." Quote from CBC News, "Canadian military says underfunding serious problem for defence forces," May 27, 2005, http://www.cbc.ca/news/canada/canadian-military-says-underfunding-serious-problem-for-defence-forces-1.535946.

21. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 39. As LGen Hood put it at the 2016 Air Power Symposium, the RCAF "must continue to be intelligent advocates of air power." Hood, "Panel #1 Domestic, Continental and Deployed Operations," 17.

22. Col Kelvin Truss's invitation letter to Dr. Richard Goette to lecture on ASPOC, 23 August 2016; and Maj Petra Smith, "AirPower Operations Course: Building the RCAF Leaders of Tomorrow," Canada, DND, December 19, 2016, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=airpower-operations-course-building-rcaf-leaders-of-tomorrow/iwuxm2xt.

23. Heide, "Canadian Air Operations," 83; and Goette, "Command and Control Implications," 68.

24. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*; Canada, DND, A-PA-005-001/AP-001, *Duty With Honour*, 16, 30–32; "CDS Op Order – Op HONOUR"; and "CDS Directive for Integrating UNSCR 1325."

25. Allan English and Col John Westrop (Ret'd), *Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations* (Trenton, ON: CFAWC, 2007), 126, accessed May 3, 2018, http://publications.gc.ca/site/eng/9.690010/publication.html.

26. Henault, "Jointness, Expeditionary Force Projection," 6; Dr. Ross Pigeau and Carol McCann, "Re-Conceptualizing Command and Control," *Canadian Military Journal* 3, no. 1 (Spring 2002): 58, accessed May 3, 2018, http://www.journal.forces.gc.ca/vo3/no1/index-eng.asp; and Goette, "Command and Control Implications," 70. The author also thanks one of his air power mentors, LGen Fred Sutherland (Ret'd), for imparting in him the value of building professional relationships. Indeed, the theme of relationships is one of the key aspects of the CFC's National Security Program Thematic Framework, which also includes context, "so what," "everything is political" and culture. Sutherland, "Technology."

27. Quoted in Mayne, "Canadian Experience," 264.

28. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 15; Goette, "Command and Control Implications," 78; and Gladman et al., "Professional Airpower Mastery," 18. In other words, an important aspect of RCAF intellectual agility that is essential for working in expeditionary constructs is cross-cultural competence. On this subject see Brian R. Selmeski, "Military Cross-Cultural Competence: Core Concepts and Individual Development," Contract Report 2007-1 (n.p.: US Air Force Culture and Language Center, May 16, 2007).

29. Martha Maurer, *Coalition Command and Control: Key Considerations* (Washington, DC: National Defence University and the Harvard University Program on Information Resources Policy, 1994), 107. It could be argued, however, that more recent operations in which NATO has been involved have led to a larger number of disagreements and restrictions that have limited efficient military operations. Recent conflicts in Kosovo, Afghanistan, Libya and Iraq/Syria bear this out.

30. Maurer, *Coalition Command and Control*, 10.

31. See Peter Gizewski and LCol Michael Rostek, "Toward a JIMP-Capable Land Force," *Canadian Army Journal* 10, no. 1 (March 2007): 55–72, accessed May 3, 2018, http://publications.gc.ca/site/eng/9.505131/publication.html; Heather Hrychuk, "Combating the Security Development Nexus? Lessons

Learned from Afghanistan," *International Journal*, no. 64 (Summer 2009): 825–42; Michael H. Thomson et al., "Collaboration within the JIMP (Joint, Interagency, Multinational, Public) Environment" (Toronto: Defence Research and Development Canada, August 2010), accessed May 3, 2018, http://pubs.drdc-rddc.gc.ca/BASIS/pcandid/www/engpub/DDW?W%3DSYSNUM=534320&r=0; and Michael Thomson et al., "Collaboration Between the Canadian Forces and the Public in Operations" (Toronto: Defence Research and Development Canada, May 2011).

32. Ronald C. Wilgenbusch and Alan Heisig, "Command and Control Vulnerabilities to Communications Jamming," *Joint Force Quarterly*, no. 69 (2nd Quarter 2013): 56–63, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-69/; and Gilmary Michael Hostage III and Larry R. Broadwell Jr., "Resilient Command and Control: The Need for Distributed Control," *Joint Force Quarterly*, no. 74 (3rd Quarter 2014): 38–39, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-74/.

33. LCol D. W. Brown, "Cyber Mission Assurance" (service paper, CFC, 2016), accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/318/192/brown.pdf; and Maj Jennifer Foote, "Cyber: The Evolution of Mission Assurance," *InForm*, no. 14 (December 2015): 1, accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/inform/archive.asp.

34. Kainikara, *Seven Perennial Challenges*, 31.

35. Lieutenant General David A. Deptula (Retired), "A New Era for Command and Control of Aerospace Operations," *Air & Space Power Journal* 28, no. 4 (July–August 2014): 5–16, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1154138/volume-28-issue-4-jul-aug-2014/; Gladman, "Future of Allied Air Power: The United States Air Force," 45–46; Ballard et al., "Operationalizing Air-Sea Battle," 35–36; Foster, "Joint Stealth Task Force," 52; and Hostage and Broadwell, "Resilient Command and Control," 38–41. LGen Hood emphasized the need for an RCAF distributed C2 capability at the 2016 Air Power Symposium, noting specifically that "we must develop the capability to continue operations if the central node is disabled in some way;" that the RCAF must "invest in flexible C2 with in-built redundancy … and maintain our commitment to a mission command philosophy;" and that the RCAF Aerospace Warfare Centre "is carefully monitoring emerging thinking within allied air forces on dispersed C2, autonomy, and a flexible ATO cycle." Hood, "Panel #1 Domestic, Continental and Deployed Operations," 10. For a theoretical discussion of command intent, see Ross Pigeau and Carol McCann, "Establishing Common Intent: The Key to Co-ordinated Military Action," in *The Operational Art: Canadian Perspectives – Leadership and Command*, ed. Allan English (Kingston, ON: Canadian Defence Academy Press, 2006), 85–108.

36. Fitzgerald, "Delivering Air Sea Battle," 55.

37. Hostage and Broadwell, "Resilient Command and Control," 38.

38. Maj Jason M. Brown, "To Bomb or Not to Bomb?: Counterinsurgency, Airpower, and Dynamic Targeting," *Air & Space Power Journal* 21, no. 4 (Winter 2007): 76, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Archived-Editions/.

39. Goette, "Command and Control Implications," 72–73.

40. Squadron Leader Bruce Hargrave, "Mission Command in a Network Enabled Environment," *Joint Air Power Competence Centre Journal*, no. 11 (2010): 48, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-11/.

41. Hostage and Broadwell, "Resilient Command and Control," 41.

42. Hargrave, "Mission Command in a Network Enabled Environment," 48; and Goette, "Command and Control Implications," 73.

43. Hostage and Broadwell, "Resilient Command and Control," 39–40. Significantly, the word "trust/trusted" appears five times in this quotation.

44. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 16–17. See also LCol Pux Barnes, "Mission Command and the RCAF: Considerations for the Employment of Air Power in Joint Operations," no. 4 (2014), accessed May 3, 2018, http://w08-ttn-vmweb01/cfawc/en/elibrary/papers/c2-article-4-mission-command-and-the-rcaf.pdf; and Maj Pux Barnes, "Command or Control? Considerations for the Employment of Air Power in Joint Operations," *Royal Canadian Air Force Journal* 3, no. 2 (Spring 2014): 32–33, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss2-spring.page. Barnes, in particular, places emphasis on the requirement to foster mutual and reciprocal trust between commanders and subordinates—what he terms "the speed of trust." Barnes, "Mission Command and the RCAF," 4–5. In an ASPOC lecture on the fundamentals of air power, RCAF Aerospace Warfare Centre strategic analyst Brad Gladman also emphasized the importance of centralized control and decentralized execution, describing it as the most important air power tenet that enables all the others. Dr. Brad Gladman, "The 'Fundamentals' of Air Power" (lecture, Air Power Operations Course 1601, October 17, 2016).

45. Gladman, "Future of Allied Air Power: The United States Air Force," 46.

46. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 6.

47. Gongora, "Meaning of Expeditionary Operations," 26.

48. Olsen, "Quest for a New Airpower Strategy," 38–39; and Goette, "Command and Control Implications," 75.

49. Again, Op MOBILE provides a good example, as several RCAF officers played an important role in a variety of NATO positions. This included the director of strategic plans in Supreme Headquarters Allied Powers Europe (SHAPE), BGen Pierre St-Amand, and his staff who were responsible for the stand-up and staffing of the OUP planning group and, of course, LGen Charlie Bouchard as the OUP operational commander along with his supporting staff of RCAF personnel. Mayne, "Canadian Experience," 261.

50. Writing in an Arctic security context, Whitney Lackenbauer and Adam Lajeunesse discuss the advantages of maintaining the NORAD status quo. P. Whitney Lackenbauer and Adam Lajeunesse, "The Canadian Armed Forces in the Arctic: Building Appropriate Capabilities," *Journal of Military and Strategic Studies* 16, no. 4 (2016): 57–58, accessed May 3, 2018, http://jmss.org/jmss/index.php/jmss/issue/view/72.

51. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 14; and Goette, "Command and Control Implications," 76. For instance, then-Col David Lowthian reported on the fact that "numerous senior positions within the components and the CAOC were apportioned to Canada" on RIMPAC 2014 was "indicative of the credibility RCAF personnel have gained within the US military." Lowthian, "CFACC and CAOC Observations," 5. Furthermore, in discussing the RCAF's ability to plug into NORAD, LGen Hood observed that "this interconnectedness and interoperability contribute to the fact that we are a well-known and trusted air power partner at home and when operating together abroad." Canada, House of Commons, Standing Committee on National Defence, "Evidence," 2.

52. Mayne, "Canadian Experience," 262–63; LCol J. O. Penney, "Canadian Armed Forces' Effectiveness in Targeting with Air Power During Op MOBILE and Op IMPACT" (Solo Flight paper, CFC, 2016), 20, accessed May 3, 2018, https://www.cfc.forces.gc.ca/papers/csc/csc42/solo/penney.pdf; Lowthian, "CFACC and CAOC Observations," 9; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 2–3, A-9/13–A-11/13.

53. Mayne, "Canadian Experience," 254.

54. Pigeau and McCann, "Re-Conceptualizing Command and Control," 57.

55. Michael J. Hood, "Why Canadian Airmen are Not Commanding," *Canadian Military Journal* 11, no. 3 (Summer 2011): 41–48, accessed May 3, 2018, http://www.journal.forces.gc.ca/vo11/no3/index-eng.asp; and "Royal Canadian Air Force and NATO," 20.

56. Goette, "Command and Control Implications," 74, 79; and Gimblett, "Canadian Way of War," 16.

7
Jointness

INTRODUCTION

Air power is inherently joint, and the air force is the essence of jointness. Although there are indeed army-navy joint operations, the majority of joint operations are made joint by the role air forces play in conjunction with armies and/or navies. As the saying goes, 70 percent of the world is covered by water, 30 percent by land and 100 percent by air. Since it operates in the third dimension, air power's characteristics of reach and speed permit access to global theatres of operations to deliver effects. Air power allows one to redesign the joint campaign; it enables jointness and is, therefore, the "glue" that keeps the joint force together.[1] However, it also "places an added responsibility on air forces," Kainikara notes, "to be able to comprehend the land and maritime operational requirements and to tailor the air power strategy accordingly."[2] This is especially the case with the RCAF since, unlike most air forces (notably those of its Five Eyes partners), it practices the indivisibility of air power[3] by owning all military aviation in Canada.[4]

Jointness in a Canadian air power context includes RCAF core-capability assets working with the other Canadian environments as joint partners and, rather uniquely, organic-capability assets that work directly / are integrated with the other Canadian environments.[5] Whereas air power assets (such as tactical helicopters; ship-based maritime helicopters; fixed-wing air mobility aircraft; and, even, maritime-patrol and fixed-wing-attack aircraft) belong—and are thus organic—to the armies, navies and marines of other countries, in Canada they all come under the RCAF. Therefore, when the CA and RCN deploy, so too do the RCAF's tactical and maritime helicopters,[6] resulting in what could be described as "instant jointness." These factors have resulted in wide air power responsibilities for the RCAF, but they also offer unprecedented opportunities for jointness that the air forces of other countries do not have. Quite often when the RCAF deploys its organic-capability assets, they prove to be a true force multiplier for the joint partner.[7] For instance, during Op MOBILE, the RCAF's Sea King helicopters were a key enabler for the RCN.[8]

A joint approach to warfare is essential in today's security and defence environment. This is especially the case since the government sees the military as a single instrument of state power, not the individual environments. The RCAF will, thus, frequently need to take the other CAF environments into account.[9] Accordingly, one niche capability that the RCAF can possibly provide is an expertise in jointness. Since the RCAF will be required to work with its joint partners in all expeditionary endeavours, its personnel should become masters of jointness.

MASTERS OF JOINTNESS

Becoming masters of jointness does not, however, entail complete absorption into land and maritime operational constructs/requirements. Instead, as Kanikara notes,[10] air-force personnel, in addition to having a comprehension of and appreciation for the maritime and land ways of conducting operations, will need to be able to apply a level of "airmindedness" to these joint situations that their army and navy counterparts cannot.[11] It is this air power lens or perspective of RCAF personnel in core-operational communities—and especially in the organic maritime-helicopter, tactical-helicopter and maritime-patrol operational communities—working directly with the other environments in joint endeavours that is a unique aspect of Canada's air force, and it is upon this uniqueness that mastery of jointness can be built. Such a capability will be vital because jointness through an air-force airmindedness / air power lens will be necessary in potential future operations—including potential A2/AD situations—when the RCAF deploys on missions in support of the RCN (i.e., addressing the growing Russian and Chinese submarine threats) and providing an air mobile capability to assist the CA (i.e., in Eastern Europe).[12]

As part of being masters of jointness, one niche that the RCAF already possesses to a degree but can definitely develop further and be of great utility to coalition operations in expeditionary endeavours is expertise in joint-combined air power. Because the RCAF practices the "indivisibility of air power" by carrying out air power responsibilities that are organic to other services in several nations (notably the USN, US Army and USMC) in addition to core air power roles of air forces, the RCAF can offer a unique airmindedness / air power lens on the joint air power of its coalition (i.e., the "combined" part of "joint combined") partners. On the flip side, the RCAF's organic operational communities also have the advantage of working closely with the organic air power formations of joint-combined service partners, including under maritime and land component commanders in addition to the standard air component commander, which gives them a unique and valuable comprehension of and appreciation for the perspectives of soldiers, sailors and marines and how they conduct expeditionary operations. It also offers unique opportunities and operational advantages for personnel in the RCAF's organic operational communities. For instance, the CP140 community's personnel exchanges and experiences working with the USN's P-3 community allowed the RCAF to effectively operate Auroras out of Sigonella in Italy during Op MOBILE, which was "close to the

action and had the benefit of being familiar to the CP-140 personnel (who had previous experience operating from this long-range patrol base)."[13] This behoves the RCAF to ensure not only operability with USAF but also joint-combined interoperability with the other American services as well as the navies and armies of other multinational coalition partners.[14]

AIR-TO-AIR INTEGRATION

However, the RCAF is currently not ready to provide personnel with a mastery of jointness and a robust expertise in joint-combined air power. It still needs to develop in its personnel a more holistic understanding and appreciation of RCAF institutional air power responsibilities. As Kainikara has noted, an air force needs to achieve the level of environment professional air power mastery first before it can have professional mastery at the joint level.[15] Put differently, before the RCAF can integrate with its joint and combined partners, it must first integrate with itself: it needs air-to-air integration. This is recognized specifically within *Air Force Vectors*, which states that "interoperability *within the RCAF* is the necessary start point" in its effort to integrate with other actors and recognizes that Canada's air force must "transition to an integrated force in and of itself, *with a focus on air-to-air integration*, while concurrently pursuing measures to improve integration with the rest of the CAF" and other partners.[16] [emphasis added] Since there is no definition in *Air Force Vectors* of what air-to-air integration actually means or entails or how it can be achieved,[17] this study uses the following definition of air-to-air integration: the ability of the different air communities to work together, facilitated by elements of common doctrine, training and education, to ensure operational and institutional success.[18] Before it can integrate with other CAF environments and interagency partners/actors, the RCAF first needs to learn how to evolve beyond its operational community stovepipes, silos or "little air forces"[19] and integrate with itself.

Today the RCAF needs to have an overarching Air Force– or RCAF-wide identity among all Canadian air personnel. This identity must foster a greater sense of community and understanding of its various air power responsibilities based on the institution—the sum of its parts. There is a requirement to go beyond platform specialty to a greater focus on air-to-air integration to ensure interoperability between RCAF capabilities and to certify that the various RCAF communities are on the same page in terms of identity, culture and doctrine to be a fully integrated force. The RCAF requires greater air-to-air integration to develop a common air power and institutional identity if it is to reach its potential as a modern, professional air force and truly "Fly in Formation."[20]

An understanding of all RCAF air power functions and capabilities—what LGen Chris Coates has called the development of airmindedness in the RCAF—is the first step to ensuring air-to-air integration and realizing interoperability between the air force's capabilities.[21] Coates defines airmindedness as "a comprehensive understanding of air power and its optimal application throughout the operational environment."[22]

There must be an understanding of and interoperability among RCAF capabilities before progressing to achieve greater integration with the other environments. Airmindedness is, therefore, consistent with professional air power mastery because it, too, calls for RCAF personnel having a holistic understanding of air power—including its advantages but also limitations and constraints—so they can apply it to joint campaigns.[23] With this knowledge, RCAF personnel can help educate the other environments about the utility of air power and what it can bring to the table.[24] Put differently, by having "airminded" personnel with a comprehensive understanding of the application of air power via professional air power mastery, the RCAF will be more operationally and strategically effective as a professional air power institution.

As experts in air power, RCAF personnel will not only be able to apply the air power lens to a joint campaign but also, ideally, make its joint partners more "air aware," that is, have an appreciation of the capabilities the RCAF can (and cannot) offer.[25] It is unrealistic for the RCAF's joint partners to be fully airminded because their knowledge of air power is comparatively limited, as they will not have the professional mastery of air power that is unique to air-force education and culture.[26] Therefore, the best that can be achieved is to develop "air awareness" in them so that they can, at the very least, recognize and appreciate the unique part that air power can play in a joint campaign.[27] For instance, this could lead to greater appreciation of the need to ask for air power effects vice requesting specific assets or platforms—a chronic historical problem/stressor of air power integration with joint partners.[28]

Achieving air-to-air integration by fostering airmindedness and developing professional masters of air power through education is, thus, essential for the RCAF in a joint environment. An air-force officer should, ideally, be an air power expert prior to taking the joint step.[29] RCAF officers must have a thorough understanding of the virtues of air power to be able to articulate them to joint partners, at the political level and to the Canadian public—to make them more "air aware."[30] Mastery of air power will, thus, allow RCAF officers to work more effectively in a joint environment and permit them to compete better for resources (particularly important in a time of austerity) and senior joint command positions.[31]

JOINTMINDEDNESS

Mastery of jointness is a step up from airmindedness and can be termed "jointmindedness." This implies that the development of airmindedness in the RCAF through professional mastery of air power is a necessary precursor to achieving mastery of jointness.[32] Nonetheless, it is something that the RCAF should strive for because it can ensure that Canada's air force could make a key and even disproportionate contribution to joint campaigns. It will go a long way in ensuring greater RCAF interoperability with its joint partners, a key objective of Canada's professional air power institution.[33] RCAF mastery of jointness will also help ensure that it, as the most inherently joint environment,

will have a leg up on the other environments in understanding and applying jointness to any campaign. This, in turn, can be leveraged in coalition campaigns. RCAF personnel will have not only expertise in the wide range of Canadian air power effects (i.e., through airmindedness and professional mastery of air power) that it can impart on coalition partners but also mastery of joint effects that Canada can contribute to a coalition. As LGen Coates notes:

> It is not long in to their career that [a] pilot or aviator may find herself or himself as a liaison officer attached to a sister service, or assigned to a joint or coalition HQ, and in this role one becomes a representative of one's service and/or one's environment—increasingly so as contemporary operations become inherently more joint, more integrated and more complex. Additionally, by better understanding other aspects of air power we all become better contributors to our own operations, within our air specialty.[34]

Put simply, mastery of jointness will improve the RCAF as an air power institution, a joint collaborator and a coalition partner. It will also bode well for doctrine development.

Increased mastery of jointness and jointmindedness in Canada's air force should entail that the RCAF leads the development of joint doctrine. It is ironic that even though the RCAF is the most inherently joint of the services, it is the army that has taken the lead in developing joint doctrine. This has resulted in what some have criticized as an overly self-serving army-centric view of joint doctrine—i.e., joint spelled as "j-a-r-m-y."[35] But perhaps it is not that ironic because the army, by its nature, has many more personnel than the air force (and navy), and therefore, it produces more officers who have a foot up on their colleagues in the other environments in a variety of areas, including, and especially, joint doctrine development.

The RCAF taking the lead in the development of joint doctrine promises to benefit not only the RCAF itself but also the entire CAF. RCAF-led joint doctrine can help mitigate confusion by creating a standardized lexicon. A good example highlighted by Lieutenant-Colonel (LCol) J. P. Gagnon regards C4ISR: "the Canadian Army for example uses the term ISTAR [intelligence, surveillance, target acquisition and reconnaissance] in its doctrine even though its definition more closely resembles that of C4ISR."[36] The CDS tasked Canadian Joint Operations Command (CJOC) to take the lead with the joint ISR doctrine in October 2015. Ideally, the RCAF should have significant input into this initiative.[37]

DOCTRINE DEVELOPMENT

Whether it is taking the lead in the development of joint doctrine or RCAF doctrine, a key requirement will be to find the correct balance of interoperability within the RCAF (i.e., air-to-air integrated doctrine), with its joint partners and with coalition partners. In particular for expeditionary operations, the RCAF will need to ensure doctrinal alignment and compatibility with coalition partners—notably NATO and especially USAF. However, in doing so, the RCAF will have to be cautious:

> Compatibility, however, does not mean that Canadian doctrine has to be *identical* to the doctrine of one's allies. To simply duplicate the doctrine of another country's military is dangerous because such doctrine has been developed to reflect that nation's military organization, capabilities, culture, and strategic issues/problems, and may not fit into how CF culture has developed over the years.[38] [emphasis in original]

Similar does not mean the same. Interoperability with allies should not come at the expense of interoperability with the RCAF's joint partners. Furthermore, efforts to be interoperable with joint partners should not come at the expense of traditional air power characteristics, tenets and capabilities of allied air forces because the RCAF will be required to work closely with them on expeditionary operations. The key to RCAF doctrine will be finding a balance between allies and joint partners that reflects the unique aspects of Canadian air power.

RCAF doctrine needs to reflect that Canada's air force has unique experiences and also broader air power responsibilities than most other coalition partners (i.e., USAF). For instance, then-Col Joyce noted in 2011 the requirement for a "Canadian flavour" to its doctrine: "if we are going to be operating within a coalition environment, then we need to be able to talk the same language. But we've learned a lot of lessons from Afghanistan and a number of other operations—in command and control and in air integration—and those need to be reflected in Canadian doctrine."[39] The RCAF must, therefore, be wary of blindly adopting allied doctrinal practices that are not consistent with RCAF capabilities or responsibilities—with Canadian air power culture. As *Air Force Vectors* states, "the RCAF's core capabilities represent our institutional and operational ability to deliver expert levels of air power with the uniquely Canadian attributes."[40] This is indeed a virtue of the most recent version of RCAF capstone doctrine: it places greater emphasis on "RCAF capabilities and roles in order to execute missions."[41] It makes the RCAF consistent with both joint operations—hence the functions remain—and also combined operations with allied air forces, by articulating traditional air power capabilities. The new doctrine provides a good balance between both joint and combined interoperability, thus representing the uniqueness of Canadian air power. Nonetheless, doctrine is a living document, in that it must constantly be updated to reflect developments, such as new operational concepts, technological advancements and changes to Canadian air power culture.

SUPPORTING VERSUS SUPPORTED CAPABILITY

There is a pressing need for balance between the RCAF as a supporting capability (i.e., supporting joint partners) and as a supported capability (i.e., joint partners supporting the RCAF). Far too often, it is more the former than the latter.[42] As RAdm Hawco noted, although "every RCAF capability is someone's key enabler," there is an understanding of this but not an appreciation of it by the RCAF's joint partners. Because of this factor, RAdm Hawco observed, the RCAF "will always win the best

supporting role," largely due to its "stovepipes of excellence" that are not levelled across the air force.[43] The RCAF will need to assert itself more in joint situations; as General Vance once noted, "effective planning can't be the air force guy saying after the fact 'hey, don't forget about the air.'"[44] In particular, air power academic Olsen advocates that air forces "must embrace a specifically air-minded approach" and "stop accepting the view of airpower as merely an adjunct to or substitute for ground-based operations."[45]

For the RCAF to have the ability to assert itself in joint situations, the RCAF must first be institutionally on the same page. This will require developing airmindedness and professional air power mastery to enable the kind of air-to-air integration required for the pan-air force "flying in formation" approach. If it is able to do this, the RCAF will be able, borrowing from RAdm Hawco's analogy, to increasingly win the best actress or actor award. Op MOBILE is a good example of the RCAF taking a leading role because, although it was a joint campaign, it was predominantly air-centric. However, this also begs the question: was the RCAF's "supported" vice "supporting" narrative during Op MOBILE leveraged to its fullest? Indeed, it is probable that future A2/AD scenarios will be air heavy, especially in Eastern Europe,[46] and so, the RCAF will need to leverage its supported capabilities to greater effect.

A key challenge for the RCAF will be finding the right balance between "core" RCAF air power capabilities and "organic" air power capabilities to serve the interests of its joint partners. Even though a joint approach to warfare is essential in today's security and defence environment, the RCAF must also be wary of being overly focused on jointness, lest it neglect its core air power capability responsibilities and interoperability with allied air forces. It will also require understanding and appreciation of when air power may not be the proper solution to a problem. LGen Coates puts this best: "Where operations do not directly involve air activities, the absence of air power should be the result of a considered decision to forgo the use of air—the result of an airminded decision—not the failure to understand air power."[47] To truly capitalize on being the supported instead of the supporting capability will require creativity and intellectual agility on the part of RCAF personnel to ensure that both joint and core air power needs are properly taken into consideration. Furthermore, these needs have to be balanced against the allied requirements to guarantee that Canadian interests are met.

Lastly, the RCAF should also not grow complacent in its exercise of the indivisibility of air power. Kainikara has noted that "the recurring tussle in many armed forces for the control of air assets is perhaps a clear indication that at the military strategic level there still exists a lack of understanding about the nature and theory of air power and its effective application."[48] The irony in Canada is that there is apparently no such tussle because the RCAF owns all military air assets. However, the RCAF should be cautious of believing that it does not have to defend its air power "turf" against the other environments. In fact, the RCAF should be more vigilant and, therefore, pursue greater professional air power mastery and airmindedness throughout the institution, lest it become a target of the other two environments.

NOTES

1. Air Commodore Frans Osinga, "AQ, ISIS, Postmodern Warfare, The Pivot & the Paradox of European Air Power" (presentation, "The Transformation of European Airpower: Lessons for the Royal Danish Air Force" conference, Centre for Military Studies, The Kastellet, Copenhagen, Denmark, November 12–13, 2014); and Kainikara, "Future Relevance of Smaller Air Forces," 6. USAF Chief of Staff General David Goldfein observed that "airpower has become the oxygen the joint force breathes. Have it and you don't even think about it. Don't have it, and it's all you think about." Technical Sergeant Joshua DeMotts and Staff Sergeant Alyssa C. Gibson, "AF Lead ers Discuss Budget, Operations during State of the Air Force," 6. USAF Secretary of the Air Force Public Affairs Command Information, August 10, 2016, accessed May 3, 2018, http://www.af.mil/News/ArticleDisplay/tabid/223/Article/910993/af-leader-discuss-budget-operations-during-state-of-the-air-force.aspx.

2. Kainikara, "Future Relevance of Smaller Air Forces," 6.

3. This notion stresses that all military air forces of a nation should be under a separate service, the air force, so as to ensure the proper concentration and use of air power in the hands of those best trained for it, air force officers. James A. Winnefeld and Dana J. Johnson, *Joint Air Operations: Pursuit of Unity in Command and Control, 1942–1991* (Annapolis, MD: Naval Institute Press, 1993), 7. According to Kainikara, a smaller air force has a balanced force of air power capabilities. In the case of the RCAF, because it exercises the indivisibility of air power, it is constantly challenged to meet its very broad range of air power responsibilities.

4. The exceptions are those air power capabilities that the RCAF contracts out and the CA's and RCN's recent employment of RPAs. Notably, the RCAF does not currently employ an RPA capability.

5. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 27, 29.

6. Goette, "Command and Control Implications," 77.

7. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 16–20. *Air Force Vectors* states explicitly that "because the provision of air power is critical to the other elements' success, our support to joint operations and the civil power is a core capability that the RCAF must provide." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 29.

8. As Richard Mayne notes, RCAF Sea Kings were "particularly useful for tracking smaller vessels as well as extending both frigates' over-the-horizon radar capability. Yet, the CH124's main strength lay in its ability to build situational awareness along Libya's coast for the RCN and other NATO navies. Providing 'top cover' for naval boarding parties was another function that rounded out the RCAF's multi-capable and flexible contribution." Mayne, "Canadian Experience," 260–61.

9. Then-Deputy Minister of National Defence Richard Fadden (remarks, 2014 RCAF Air Power Symposium, CFC, Toronto, November 5, 2014); and Kainikara, "Professional Mastery and Air Power," 54.

10. Kainikara, "Future Relevance of Smaller Air Forces," 6.

11. Gladman et al., "Professional Airpower Mastery," 12. The term used in the publication from which the quotation is gleaned is "airpower mindedness," which has a strong correlation to the concept of "airmindedness."

12. NATO, JAPCC, *Alliance Airborne Anti-Submarine Warfare*; Col Iain Huddleston, "Changing with the Times: The Evolution of Canada's CP-140 Aurora," *Royal Canadian Air Force Journal* 5, no. 1 (Winter 2016): 44–51, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2016-vol5-iss1-winter.page; Goette, "RCAF's Uniquely Canadian Helicopters,"

26–35; LCol Jeannot Boucher, "Tactical-Aviation Mobility," *Royal Canadian Air Force Journal* 4, no. 4 (Fall 2015): 26–28, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2015-vol4-iss4-fall.page; Goette, "By Air to Battle," 51–59; Chris Thatcher, "Rise of the Battalion: Chinook Helps Transform Tactical Aviation," *Vanguard*, August/September 2014, 20–22, accessed May 3, 2018, http://vanguardcanada.uberflip.com/i/392905-augsept-2014-v2; Canada, DND, *FAOC*, 8, 17–18, 22; Ballard et al., "Operationalizing Air-Sea Battle," 37–38; and US, Air-Sea Battle Office, "Air-Sea Battle," 11–12.

13. Heide, "Canadian Air Operations," 82. Quote from Mayne, "Canadian Experience," 252.

14. Goette, "Command and Control Implications," 77. *Air Force Vectors* notes that "the RCAF will engage with the air forces, armies, and navies of allied and non-allied nations to enhance airpower knowledge." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 38.

15. Kainikara, "Professional Mastery and Air Power," 52–53. See also Rook, "Airpower Mastery," 10–11, 14–16.

16. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 36, 37.

17. Literature on RCAF air-to-air integration has been sparse and what has been written has largely focused on tactical interoperability between platforms. This type of interoperability is, of course, very important, and the author supports such initiatives. However, the RCAF should go beyond tactical interoperability and seek institutional air-to-air integration. For an example of tactical air-to-air integration see "Doctrinal Shift: Air Force Adjusts to New Capabilities, Structure and Operations," *Vanguard*, July 2011, accessed May 3, 2018, https://vanguardcanada.com/2011/07/01/doctrinal-shift-air-force-adjusts-new-capabilities-structure-operations/; Mayne, "Canadian Experience," 259–60, 265; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 4.

18. Maj Bill March, "'Flying in Formation – Not!' A Look at How Well the Various Elements of Canada's RCAF Played Well Together from 1924–1945" (paper, 25th Military History Colloquium, 9–10 May 2014, Wilfrid Laurier University, ON).

19. On the RCAF's operational communities see English and Westrop, *Canadian Air Force Leadership*, 156–61. In 2011, then-Col Derek Joyce, CO CFAWC, noted that "traditionally we've had six different air forces, often termed titanium cylinders of excellence, because each community operated in isolation." "Doctrinal Shift."

20. First coined by LGen Alain Parent, "Fly in Formation" refers to the vision of former RCAF Commander, LGen Mike Hood, who stressed that every member of the air force contributes to the "mastery of airpower." "Lieutenant-General Michael Hood: Change of Command Ceremony Speech," LGen Michael J. Hood, Canada, DND, July 9, 2015, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=lieutenant-general-michael-hood-change-of-command-ceremony-speech/ibts4xtx; and "Royal Canadian Air Force and NATO," 21.

21. BGen Christopher J. Coates, "Airmindedness: An Essential Element of Air Power," *Royal Canadian Air Force Journal* 3, no. 1 (Winter 2014): 70–84, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss1-winter.page; and LGen Chris Coates, "Airmindedness in the RCAF" (presentation and speaking notes, Air Power Symposium 2016, 31 March – 1 April 2016, 4–5), accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/air-power-symposium/2016.asp.

22. Coates, "Airmindedness," 77. Coates adds further that "the Canadian view of airmindedness needs to reflect that airmindedness is applicable to all aspects of air power, from air superiority and air dominance to the delivery of logistics in combat and in domestic humanitarian relief to joint air operations conducted with partners from other environment[s] or with allies." Coates, "Airmindedness," 77–78.

23. Coates, "Airmindedness," 78; and Coates, "Airmindedness in the RCAF," 6. Coates adds: "Airmindedness must be grounded in jointness, in the truest sense of the word." Coates, "Airmindedness in the RCAF," 6.

24. Olsen, "New Concept for the Application"; and Olsen, "Quest for a New Airpower Strategy," 28. For instance, factors such as, but not limited to, maintenance, yearly flying rates and training requirements place limits on platform availability. This needs to be explained to the RCAF's partners—in addition to inculcating in them the requirement to ask for air power effects vice requesting specific assets.

25. Coates, "Airmindedness," 76; and Coates, "Airmindedness in the RCAF," 6.

26. Kainikara describes the connection between airmindedness and air force culture—and the subsequent importance of air power education—as follows: "All organisations have their own distinctive cultures. However, there is an aspect of culture that is peculiar to air forces that must be considered in analysing the organisational intellect of the force. This is the fact that knowledge of the underlying principles that guide the employment of air power is a vital and essential part of the air force culture. The influence of such knowledge, in the culture of other military environments, is relatively lesser in degree. For an air force, the employment of air power is its primary responsibility and it can only be effective if the organisation has the requisite knowledge resident within it to enable its effective application. Air power education is the process by which the adequacy of this knowledge is ensured. In a lasting manner, air power education reinforces the air force culture, which forms one of the core elements that ensures the operational competence of the force." Kainikara, "Professional Mastery and Air Power," 59.

27. Coates, "Airmindedness," 79. This is something that RCAF officers in the tactical aviation community have experience in. One member of this community noted that when they attended the Army Development Period 2 Army Operations Course, the Army officers asked them to explain RCAF doctrine to them, which forces the RCAF officers to self-educate themselves on the doctrine. Ideally, no such self-education should be required of RCAF officers. RCAF officer email to author, September 12, 2016.

28. See 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, A-6/13 for a SOF example of this tendency.

29. Canada, DND, A-PA-005-001/AP-001, *Duty With Honour*, 76; Kainikara, "Professional Mastery and Air Power," 60; and Gladman et al., "Professional Airpower Mastery," 14.

30. It is particularly essential for airminded RCAF personnel to develop "air awareness" in CJOC, which since its initial establishment as CEFCOM has been chronically army-dominated (particularly after the primarily army-focused Afghanistan mission). This is especially needed if we are to accept that air power is the "glue" that holds the joint force together and that the RCAF is the most inherently joint of the services. Email from RCAF officer; Gladman et al., "Professional Airpower Mastery," 16; and Penney, "Canadian Armed Forces' Effectiveness."

31. Gladman et al., "Professional Airpower Mastery," 20. On the requirement for the RCAF to compete better for senior command positions see Hood, "Why Canadian Airmen."

32. Coates, "Airmindedness," 76. Coates notes specifically that the concept of jointmindedness "merits further examination."

33. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 36.

34. Coates, "Airmindedness in the RCAF," 6.

35. Olsen, "New Concept for the Application"; and author's observations teaching joint PME at the CFC.

36. LCol J. C. J. P. Gagnon, "RCAF C4ISR: At a Turning Point" (Solo Flight paper, CFC, 2016), 5, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/318/305/338.pdf.

37. Gagnon, "RCAF C4ISR"; and Maj S. N. M. Harding, "The Requirement for Intelligence, Surveillance and Reconnaissance Occupations in the Canadian Armed Forces" (service paper, CFC, 2016), 1, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/318/192/harding.pdf.

38. Goette, "Command and Control Implications," 75.

39. "Doctrinal Shift."

40. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 26.

41. LGen M. J. Hood, "Foreword" in Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, ii.

42. On supporting versus supported see Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 28. Air power theorist Lieutenant General David Deptula (Retired) captures the supported-supporting challenge for air forces nicely: "militaries have been inculcated with a belief in the combined arms approach and, in some cases, continue to adhere to the anachronistic belief that airpower should only be used as a supporting arm of land and sea operations." Lieutenant General David A. Deptula (Retired), "Intelligence, Surveillance, and Reconnaissance in the Information Age," *Leading Edge Airpower*, June 9, 2015, accessed May 3, 2018, https://leadingedgeairpower.com/2015/06/09/intelligence-surveillance-and-reconnaissance-in-the-information-age/.

43. Hawco (presentation).

44. Then-MGen Jonathan Vance quoted in Coates, "Airmindedness," 76.

45. Olsen, "Quest for a New Airpower Strategy," 38.

46. See Kofman, "Expensive Pretzel Logic"; and McCabe, "Russian Perception of the NATO," 65–77.

47. Coates, "Airmindedness," 78.

48. Kainikara, "Professional Mastery and Air Power," 56. See also his chapter on "The Question of Independence" in *Seven Perennial Challenges*, 63–67.

8

Intelligence, Surveillance and Reconnaissance

INTRODUCTION

ISR is another potential niche capability the RCAF can provide to coalition expeditionary operations. Embodying the Sense function and the air power characteristic of elevation to permit observation, ISR is a fundamental role and core capability that the RCAF provides not only for itself but also for its joint army and navy partners; combined allied partners; and, increasingly, multi-agency partners. The RCAF is, therefore, both a provider and user of ISR, which makes interoperability essential. Having robust ISR is, thus, not only vital to enable RCAF core-capability operations but also part of a multi-environment, multination and multi-agency effort to gain situational awareness and subsequent decision superiority in support of Canada's national strategy.[1]

A robust ISR capability is also consistent with first-principle air power responsibilities. As RCAF doctrine notes, it is essential for peacetime and domestic operations such as supporting "sovereignty operations, building intelligence databases, guiding tactics development, assisting capability development, and providing indications and warning," which includes working in conjunction with Canada's American allies in NORAD to detect aerospace threats.[2] Furthermore, *Air Force Vectors* recognizes that "securing both Canadian and North American borders, as well as ensuring the security of expeditionary forces, requires comprehensive and sustained intelligence, surveillance and reconnaissance (ISR) capabilities to achieve situational awareness."[3]

Recent coalition expeditionary campaigns have demonstrated that there is a high demand for not only ISR in general but also specific RCAF ISR capabilities. For instance, there was a shortage of ISR during OUP, and in particular, the RCAF targeting team "was reliant on other nations' intelligence products for the development of target packages to be prosecuted by the CF118."[4] The ISR shortage was particularly prevalent among European NATO contributors, which resulted in a heavy reliance on American ISR capabilities

and a greater Canadian ISR contribution than originally anticipated. This necessitated the RCAF detachment of two Auroras to fly almost daily, logging 1,403.1 hours on 179 ISR and maritime-patrol missions,[5] leading one European observer to remark that the RCAF CP140 "played a significant role throughout the campaign."[6] Aurora missions included a new role in strike coordination and reconnaissance – coordinator (SCAR-C). The flexibility and professionalism of RCAF crews combined with the Aurora's enhanced capabilities and mission suite not only led to the successful prosecution of this role but also made the CP140 the preferred SCAR-C platform of Canada's British allies.[7] Additionally, the fact that Canada left the CP140 in Kuwait while bringing back the CF188s shows how vital ISR was to that campaign.[8] The demand for ISR will only increase in future operations, including and especially A2/AD scenarios in the South China Sea or the Baltic.[9] Moreover, the recent initiative to establish a NATO or multinational joint ISR unit in Europe (based on a study of recent expeditionary campaigns and the planned drawdown of American ISR assets on the continent) speaks to the premium on and importance of ISR in modern operations, further justifying an RCAF focus on this capability.[10]

RCAF ROLE

An RCAF ISR niche would permit the RCAF to implement a robust range of solutions to modern expeditionary operations with respect to surveillance; reconnaissance; situational awareness; and information collection, processing, exploitation and dissemination. Collecting, managing, exploiting and assuring information will dominate several aspects of future operations, including A2/AD situations.[11] But ISR goes beyond A2/AD situations because it is arguably needed for any kind of operation across the spectrum of conflict.[12] A robust ISR capability for conventional operations can, thus, also be utilized for full-spectrum operations. Therefore, maintaining a competent ISR capability is one of the RCAF's future critical elements.

Having the best intelligence possible supported by robust ISR is essential for accurate and effective targeting. As noted air power author Col Olsen put it, "air power is seldom more effective than the intelligence it relies on for targeting."[13] An ISR capability is needed not only up to and during the targeting strike but also afterwards to measure and assess effects. Especially in this age of avoiding collateral damage, being absolutely sure about what one is targeting is essential. Moreover, having real-time information necessitates greater persistence capabilities of platforms. It is, therefore, not surprising that ISR is centrally located within the joint air tasking cycle.[14]

The RCAF may want to consider developing a niche ISR occupational community/trade specialty.[15] Since managing information is essential in modern operations, trained RCAF ISR experts could be a potential force multiplier, especially as the RCAF fields a new multimission aircraft; adopts an unmanned ISR capability, in the form of the Joint Unmanned Surveillance and Target Acquisition (JUSTAS) project; and grows more capable in expanding space-based ISR assets since the recent incorporation of space into

its portfolio.[16] ISR specialists will give the RCAF essential expertise in collecting, filtering, fusing, analysing and disseminating knowledge to improve situational awareness, actionable intelligence and C2 decision making. Such specialists will, ideally, be able to ensure the processing, exploitation and dissemination of ISR information by taking collected raw data, processing and analysing it as well as transforming it into relevant information and knowledge for C2 decision makers—distinguishing between what is "need to know" and "neat to know." Professional judgement and analytical skills in a filtering and assessment process will also be necessary to avoid a situation of information overload where "'too much' information can lead to decision paralysis."[17]

The RCAF should not, however, pursue the development of a full ISR-capability enterprise. The resources needed to ensure the proper collection, management, exploitation and assurance of information are prohibitive for a smaller air force like the RCAF. For instance, the USAF ISR enterprise "dedicated to analyzing and disseminating intelligence to empower decision makers, identify targets, enable air strikes, and protect Joint and Coalition forces" consists of 34,000 people, which is almost twice the size of the entire RCAF (Regular Force, Reserves *and* civilians).[18] The RCAF must, therefore, be modest and realistic regarding its future ISR enterprise.

EVERY PLATFORM A SENSOR

The RCAF should consider adopting the USMC's approach to ISR of "every platform a sensor." This entails not only having platforms for which ISR is the primary role but also having a sensing digital interoperability capability for each platform that can be networked together.[19] In 2011, then-Col Joyce, CO CFAWC, explained an example of how this could be accomplished in the RCAF: "the F-18 has a sniper pod; if you think about it, you have a fast platform that if there is air-to-air refuelling can stay up for a reasonable amount of time and now has a video capability. While it's not historically looked at as a 'sense' platform, it certainly could be employed in a 'sense' function."[20] To adopt an every-platform-a-sensor approach, however, the RCAF would need to have the most up-to-date and robust network, sensors and communications systems (i.e., Link 16) on its platforms to guarantee that they are able to talk to each other. This will ensure that every RCAF platform is a node in a networked sensing system that can seamlessly integrate with each other and also "plug in" to an alliance or coalition network. The emphasis here is the need for a standardized networked system throughout the RCAF and its joint partners that is compatible with allies. Indeed, securing such network connectivity would go a long way toward ensuring greater RCAF interoperability with its expeditionary partners.[21] This is consistent with Vector 2 in *Air Force Vectors*, which states that the RCAF "will maintain and advance interoperability and pursue full-networked capability to ensure Canadian air power remains a key enabler to the success of CAF operations."[22]

CP140 AURORA

Even though the RCAF will be able to capitalize on the ISR capabilities of all of its platforms by supplementing its sensors to make it a node in a vast sensing network, the main focus of this section is on emphasizing the niche value of the CP140 Aurora's ISR capabilities to coalition expeditionary operations. Indeed, while it behoves the RCAF to capitalize on ISR capabilities of any of its platforms by supplementing their sensors, it is also important to recognize the value of the specialized and dedicated ISR capabilities of the Aurora. The CP140 has undergone the Aurora Incremental Modernization Project (AIMP) and Aurora Structural Life Extension Program (ASLEP), and as Col Iain Huddleston noted in a *Royal Canadian Air Force Journal* article, "the CP-140M Block 3 Aurora is rapidly being established as the pillar upon which Canada's overall intelligence, surveillance and reconnaissance system will be built."[23]

The CP140 enables the Canadian government to make an essential coalition contribution. As a supporting capability,[24] ISR is more likely to receive multiparty political support because it potentially avoids the debates surrounding the deployment of kinetic air power assets. Notably, although Canada's government withdrew RCAF CF188s from Op IMPACT, it kept the other two platforms in theatre. One of them is the Aurora (the other is the Polaris), a clear recognition by the government of the value of RCAF ISR assets.[25] It is also an asset that allies have recognized, so Canada may be asked to provide more Aurora resources to future coalition operations.

Although there may be greater willingness to use remotely piloted aircraft (RPA) in contested environments because of the lack of a risk to human casualties, the crewed Aurora offers the RCAF and its allies the most flexible ISR for the near future. It has a long endurance, which allows for more persistent ISR (including identifying pattern-of-life aspects of potential targets), and has recently incorporated a beyond-line-of-sight capability to provide instantaneous information to the theatre commander. The Aurora also features sensors and a state-of-the-art imaging radar system that can collect information in poor weather and cloudy conditions. Unique from an RPA, the crewed Aurora is more flexible, in that it is capable of shifting its focus "on-the-fly," and its size means its crews can be increased to accommodate more SMEs (e.g., liaison officers, forward air controllers, etc.). Having humans on board also gives it the tried-and-true air power observation "Mark I eyeball" capability that an RPA does not possess.[26] If the RCAF anticipates deploying the Aurora on several expeditionary missions in the future, it may want to consider getting even more "bang for the buck," by arming the Aurora so that it has an offensive air support and C2 platform capability "to provide a supported commander with an unparalleled ability to sense within and affect his area of operations."[27]

The CP140 Aurora fulfilled the important dual (but related) roles of maritime-patrol aviation and ISR during Op MOBILE. Indeed, the CP140 has received praise from coalition partners for its unique ISR capabilities in recent operations (Ops MOBILE

and IMPACT).[28] This means that the Aurora's unique capabilities will remain in high demand by coalition partners. The Aurora is also a victim of its own success, as it is perhaps the RCAF platform in greatest demand due to its dual antisubmarine warfare and ISR capabilities. Availability of the aircraft for both over-land and over-water operations in support of the RCN will, therefore, be a constant challenge, as the RCAF only possesses 18 CP140 Auroras.[29] Moreover, since they also perform a vital role in domestic surveillance and the maritime patrol of Canada's internal and coastal waters, a metric will need to be developed to determine how to deploy the Aurora on expeditionary operations to perform a variety of roles. The metric for Op MOBILE was deploying two aircraft to give the Aurora 100 percent availability,[30] but this was while modernization, now since completed, was ongoing. A new metric based on the completed modernization is now needed.

This metric will also need to determine, again based on demand and availability of deployed CP140 aircraft, how many platforms and also how many mission hours can be dedicated to provide a balance between largely "core" air-force roles (such as ISR support for targeting) and organic or joint roles (such as traditional maritime patrol, ISR support for surface forces and specialized missions such as SCAR-C).[31] Care will also have to be taken in tasking the Aurora on such specialized joint missions because it is not an ideal platform for SCAR-C. It cannot mark targets or deliver kinetic effects (though the previous suggestion to arm the CP140 would partially remedy this shortcoming), and since it has no defensive capability, it would be more vulnerable to enemy air defences in a contested environment.[32]

One of the major challenges for the RCAF CP140 will, therefore, be its inability to operate in a contested A2/AD environment. For instance, in his excellent article on the end of the age of air superiority, Jay Ballard outlines the difficulty of conducting persistent ISR (which air-force personnel, notably those involved in targeting, have become accustomed to) in a non-permissive environment.[33] One solution could be to procure RPAs and use them as ISR platforms in a contested environment because they do not put aircrew at risk. However, RPAs are just as vulnerable—if not more so—than the Aurora. Given the high cost of the platforms themselves and their supporting infrastructure, it would be difficult to justify the loss of RPAs in a contested environment. The RCAF should, therefore, consider equipping the Aurora with a self-defence capability if it anticipates operating it in a contested environment.[34] A robust self-defence suite should also be a necessary feature of the planned multimission aircraft to replace the Aurora.[35]

SPACE

The transfer of space from being a joint capability to the RCAF is another opportunity for the RCAF to develop an ISR niche. Current Canadian space ISR capabilities (including Polar Epsilon, Saphire and RADARSAT), plus plans to launch additional RADARSAT satellites, will enhance the RCAF's ISR capabilities. With its new responsibility for space,

the RCAF will have to study how space becomes a true force enabler and force multiplier for ISR. As the RCAF *FAOC* notes, "although not yet identified as such, core RCAF space capabilities could consist of space surveillance, aerospace warning, space-based communications, space-based navigation and space-based S&R [surveillance and reconnaissance]."[36] The RCAF should also leverage its close connection with USAF to capitalize on its commitment to space dominance and subsequent technological developments. Indeed, the RCAF is already inextricably linked to space in terms of doctrine, organization and training via NORAD, so it should capitalize on the "space" part of the North American Aerospace Defence Command by utilizing NORAD as a gateway to US space expertise.[37]

Nonetheless, there are also a number of limitations and challenges that an RCAF space capability will face. For one, RCAF space assets will be vulnerable to space debris, antisatellite weapons, increased congestion in space and disabling cyberattacks.[38] In addition, the RCAF will have to compete with other government and civilian groups in Canada for access to the country's space assets. The current "digital generation" and modern wired society mean that there is increasing reliance on satellites in everyday life. As the *Future Security Environment 2013–2040* notes:

> As society becomes increasingly mobile, the demand for precise and timely information suggests that access to space-enabled systems will only increase in importance. Space-enabled systems transmit data, voice and video and play a critical role in collecting and distributing information contributing to global communications; environmental monitoring; natural resource management; disaster assistance and mitigation; and weather (terrestrial and space) forecasting.[39]

Furthermore, there are also constraints on satellites due to the limited pre-calculated intervals to provide ISR. Therefore, the requirement for crewed aircraft, as outlined in the CP140 Aurora section, will remain an essential RCAF ISR consideration.[40]

There is great potential for RCAF ISR capabilities by operationalizing the space domain. Indeed, greater interdepartmental and joint cooperation in space efforts with RCAF partners promise to protect Canadian security interests in space and allow Canada to make an important foreign policy and alliance contribution.

NOTES

1. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 29–30; Canada, DND, *FAOC*, 5; Gagnon, "RCAF C4ISR," 2–3; and Deptula, "Intelligence, Surveillance, and Reconnaissance."

2. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 37.

3. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 22. See also Lackenbauer and Lajeunesse, "Canadian Armed Forces in the Arctic," 54.

4. Phinney, "Reflections on Operation Unified Protector," 88. Quote from 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5.

5. Anrig, "Allied Air Power over Libya," 266, 271; Mayne, "Canadian Experience," 251, 258; 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, A-2/13; Robert Murray, "How NATO Makes the Unknown Known: A Look at the Improvements in NATO Joint Intelligence, Surveillance and Reconnaissance," *Joint Air Power Competence Centre Journal*, no. 22 (Spring/Summer 2016): 12, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-22/; Matthew J. Martin, "Unifying Our Vision: Joint ISR Coordination and the NATO Joint ISR Initiative," *Joint Force Quarterly*, no. 72 (1st Quarter 2014): 55, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-72/.

6. Anrig, "Allied Air Power over Libya," 266.

7. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 4; Mayne, "Canadian Experience"; and Penney, "Canadian Armed Forces' Effectiveness," 14. See also Alan Lockerby, "SCAR-C over Libya: To War in an Aurora," *Canadian Military Journal* 12, no. 3 (Summer 2012): 63–67, accessed May 3, 2018, http://www.journal.forces.gc.ca/vol12/no3/index-eng.asp.

8. Campbell, "Op IMPACT," 25; Canada, DND, "Operation IMPACT"; and Barton, "Justin Trudeau to Pull Fighter Jets."

9. Maj William Giannetti, "A Commonsense Approach to Intelligence, Surveillance, and Reconnaissance Operations," *Air & Space Power Journal* 30, no. 3 (Fall 2016): 78, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1151200/volume-30-issue-3-fall-2016/; and Andrew Robert Marvin, "ISR Support to Operational Access: Winning Initiative in Antiaccess and Area-denial Environments," *Joint Force Quarterly*, no. 71 (4th Quarter 2013): 54, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-71/.

10. On the NATO multinational joint ISR unit proposal, see NATO, JAPCC, *NATO / Multinational Joint Intelligence, Surveillance and Reconnaissance Unit: A Feasibility Study*, White Paper (Kalkar, Germany: JAPCC, October 2015), accessed May 3, 2018, https://www.japcc.org/portfolio/nato-mnjisru/; Murray, "How NATO Makes the Unknown"; and Martin, "Unifying Our Vision."

11. See, for instance, Deptula, "Evolving Technologies in the 21st Century"; and Marvin, "ISR Support to Operational Access," 53–57.

12. It has proven essential for establishing pattern-of-life information in COIN and counterterrorism campaigns. For instance, the strike against Abu Musab al-Zarqawi, which took only 10 minutes of kinetic F-16 operations, was preceded by more than 600 hours of ISR operations. Deptula, "Intelligence, Surveillance, and Reconnaissance." On the value of ISR on UN PSOs, see A. Walter Dorn, *Keeping Watch: Monitoring, Technology and Innovation in UN Peace Operations* (Tokyo: UNU Press, 2011).

13. John Andreas Olsen, ed., *A History of Air Warfare* (Washington, DC: Potomac Books, 2010), 190.

14. Penney, "Canadian Armed Forces' Effectiveness," 6.

15. This is a suggestion that RCAF Maj Harding has made in a CFC Components Capabilities Service Paper. Harding, "Requirement for Intelligence, Surveillance."

16. "Canadian Multi-Mission Aircraft," in *Defence Acquisition Guide 2015*, Canada, DND, accessed May 3, 2018, http://www.forces.gc.ca/en/business-defence-acquisition-guide-2015/aerospace-systems-57.page; Danny Garrett-Rempel, "Will JUSTAS Prevail? Procuring a UAS Capability for Canada," *Royal*

Canadian Air Force Journal 4, no. 1 (Winter 2015): 19–31, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2015-vol4-iss1-winter.page; Maj Nathan Burgess, "Royal Canadian Aerospace Force? An Examination of the Conceptual Utility and Organizational Implications of the Aerospace Concept" (paper, CFAWC, October 1, 2015), accessed May 3, 2018, http://w08-ttn-vmweb01/cfawc/en/elibrary/papers/royal-canadian-aerospace-force.pdf; and RCAF Public Affairs, "RCAF Assumes Responsibility for National Defence Space Program," *Airforce Magazine* 40, no. 2 (Fall 2016): 5–6.

17. This paragraph references Canada, DND, *Projecting Power: Canada's Air Force 2035*, ed. Dr. Andrew B. Godefroy (Trenton, ON: CFAWC, 2009), 15, accessed May 3, 2018, http://publications.gc.ca/site/eng/9.692104/publication.html; Goette, "Command and Control Implications," 71; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 11; Harding, "Requirement for Intelligence, Surveillance," 4–5; Deptula, "Intelligence, Surveillance, and Reconnaissance." Quote from Canada, DND, *Projecting Power*, 15. In 2011, then-Col Derek Joyce, CO CFAWC, noted that "It is very easy to become overwhelmed. The U.S. air force is experiencing a situation where they have far more collection capability than they have analysis capability. We need to make sure that within the CF air force, as we progress our collection abilities, we also progress our analysis capabilities so we don't end up with a number of different flows of information that we are not capable of assessing." "Doctrinal Shift."

18. The Honorable Deborah Lee James and General Mark A. Welsh III, "USAF Posture Statement 2016" (n.p.: Department of the Air Force, February 10, 2016), 2, accessed May 3, 2018, http://www.af.mil/Portals/1/documents/airpower/FY16_AF_PostureStatement_FINALversion2-2.pdf. As Todd Phinney has noted, commenting on the 2011 Libya air campaign, "at the core of this limitation is the fact that few countries have the national capability to collect intelligence, analyze it, share it on classified architecture, and then develop the high-fidelity targeting materials necessary for an aerial campaign where collateral damage is a concern." Phinney, "Reflections on Operation Unified Protector," 88.

19. US, United States Marine Corps, *Marine Aviation Plan 2015* (20 October 2014), 6, accessed May 3, 2018, https://marinecorpsconceptsandprograms.com/sites/default/files/files/2015%20Marine%20Aviation%20Plan.pdf; Deptula, "Intelligence, Surveillance, and Reconnaissance"; and Canada, House of Commons, Standing Committee on National Defence, "Evidence," 15. In fact, former Commander RCAF, LGen Hood, indicated his interest in this approach at the 2016 RCAF Air Power Symposium. Hood, "Panel #1 Domestic, Continental and Deployed Operations," 10.

20. "Doctrinal Shift."

21. Gagnon, "RCAF C4ISR," 4. See also Deptula, "Evolving Technologies in the 21st Century."

22. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 36. See also the *FAOC*, which acknowledges "that CAF is now firmly in the contemporary information age and that—in order to exploit existing and future capabilities to operate successfully in challenging operating environments—there is no longer any option but to transform into an integrated and networked force." Canada, DND, *FAOC*, 6.

23. This paragraph references Thatcher, "Planning for Power." Quote from Huddleston, "Changing with the Times," 50.

24. As it currently stands, ISR is a capability that supports operations. However, there are some who argue, specifically, that it should be combined with command, control, communications and computers into C4ISR and recognized as a main operational capability. See, for instance, Deptula, "Intelligence, Surveillance, and Reconnaissance"; and Gagnon, "RCAF C4ISR," 3, 17–19.

25. Canada, DND, "Operation IMPACT"; and Barton, "Justin Trudeau to Pull Fighter Jets."

26. This paragraph references Huddleston, "Changing with the Times," 44–47; Campbell, "Op IMPACT," 25; and Captain A. A. Lockerby, "Future CP140 Overland Prospects," Appendix 2 to Annex A to 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio. Much of this appendix appears as an article in the *Canadian Military Journal*; see Lockerby, "SCAR-C over Libya."

27. Lockerby, "Future CP140 Overland Prospects."

28. Peter O'Neil, "Canada Punching Above Its Weight in Military Alliance, Gates Tells Officials," *Winnipeg Free Press*, June 11, 2011; and Tom Blackwell, "Canada Contributed a Disproportionate Amount to Libya Air Strikes: Sources," *The National Post*, August 25, 2011 cited in Mayne, "Canadian Experience," 240.

29. This is an especially pressing issue given the increasing threat from Russian submarines. See NATO, JAPCC, *Alliance Airborne Anti-Submarine Warfare*.

30. Mayne, "Canadian Experience," 251.

31. Lockerby, "SCAR-C over Libya." For example, because the Auroras flew out of Naval Air Station Sigonella, the Combined Force Maritime Component Commander (CFMCC) was granted tactical control over the CP140 detachment. Because the Aurora's capabilities were required for both maritime-patrol and ISR overland missions, this C2 arrangement became "a point of contention" and "proved to be a frequent source of friction" between the CFMCC and the Combined Force Air Component Commander. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, A-9/13.

32. Email from an RCAF officer. For instance, the Aurora was only deployed in an overland role to help fill ISR gaps once anti-air threats were reduced. In his Op MOBILE end-of-tour report, BGen Joyce noted that "had the CP140 been capable of operating in a higher threat environment it could have been used in this role [i.e., SCAR-C] months earlier to significant operational effect." It is, therefore, not surprising that one of his main recommendations was that "the RCAF should investigate equipping the CP140 with equipment necessary to operate in a higher threat environment." 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, A-4/13, 4, 5.

33. Ballard, "What's Past Is Prologue," 59. See also Marvin, "ISR Support to Operational Access," 54–55.

34. As Lockerby has noted, even if the Aurora was equipped with a self-defence capability, "all CP140 missions would still require integration with air superiority, EW and SEAD assets to ensure survivability. I would not advocate sending crews 'alone and afraid' into an area better suited for appropriately trained, tasked and equipped multirole fighters based on a threat." Lockerby, "Future CP140 Overland Prospects."

35. "Canadian Multi-Mission Aircraft."

36. Canada, DND, *FAOC*, 5, note 10.

37. Burgess, "Royal Canadian Aerospace Force?," 49.

38. Burgess, "Royal Canadian Aerospace Force?," 49; Menzel, "China's Aerospace Power 2015," 23–26; and Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 116.

39. Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 115.

40. Kainikara, *Seven Perennial Challenges*, 22.

9
Air-Expeditionary-Wing Concept

We recently developed our Air Task Force [ATF] concept with deployable expertise in 2 Wing Bagotville for missions requiring deployed RCAF assets. The Wing's personnel are prepared to deploy immediately on any assigned mission and set up an ATF, based on the specific capabilities required for the mission and consistent with processes and NATO interoperable procedures. The Wing's readiness and focus is an important step forward for the RCAF to seamlessly interoperate in any combined or Joint Task Force.[1]

– LGen Michael Hood, Commander RCAF

INTRODUCTION

In addition to the more focused capability niches explored in this study, one of the ways the RCAF can ensure it makes an important contribution to expeditionary coalition endeavours is to, well, be expeditionary. In particular, it is essential for the RCAF to have an expeditionary concept and construct that allows it to deploy self-contained, modular, scalable forces quickly into theatre and to ensure that it does not become a burden on its allies. This capability embodies the definition of air-force expeditionary operations as articulated by Allan English: "task-tailored aerospace assets, which are rapidly deployable and able to sustain themselves in operations outside Canadian territory."[2] Moreover, since "NATO doctrine has held that nations are responsible for their own deployment, sustainment, and redeployment;"[3] being expeditionary is, thus, an important capability niche that the RCAF can contribute to coalition operations. The RCAF should, therefore, fully develop and capitalize on its air-expeditionary-wing concept formed at 2 (Expeditionary) Wing.[4] It should realize all Air Force expeditionary capability (AFEC) project objectives to ensure that it can effectively deploy, establish and sustain its expeditionary force.

An expeditionary capability will mean that the RCAF will be less reliant on allies or host-nation support. The point about allies is particularly relevant. This study discussed how essential RCAF interoperability with the US military is and also, in light of the fact that the US is beginning to move away from always being involved in expeditionary operations,

that the US is desirous that its allies share more of the burdens. As *Air Force Vectors* notes, interoperability must not be just with the US but must also be with other possible coalition partners.[5] Therefore, fully developing 2 Wing's expeditionary concept and construct will mean that the RCAF will have agile, flexible, self-contained expeditionary capabilities, ensuring that it does not have to rely / be a burden on the US. Moreover, its flexibility and agility to work with and be interoperable with multiple coalition partners, in different locations across the globe and along the entire spectrum of conflict will make the RCAF a key enabler and, thus, a reliable and desirable partner for joint and combined coalition expeditionary operations.[6]

As a smaller air force,[7] the RCAF has to be modest and realistic in terms of its limitations and what it is and is not capable of incorporating into its expeditionary concept and construct.[8] Although USAF has developed very robust air-expeditionary capabilities, forces and units, it is simply not possible to adopt an American air-expeditionary model and slap a Canadian label on it. The RCAF is a unique air power institution with its own distinctive structure, responsibilities and culture, and this necessitates an air-expeditionary concept and construct that is tailored to Canadian requirements.[9]

Part of being modest/realistic also means understanding and appreciating that although the RCAF should strive to be as independent as possible, its small size and limited depth mean that there will always be at least some degree of reliance on coalition partners, joint partners, host-nation support and contractors on expeditionary operations.[10] Depending on the situation and scale of the operation, it may even be desirable from the perspective of financial and personnel strains to rely on such partners or to borrow, buy or lease equipment/services due to the high cost of bringing them in theatre and/or the need to be ready and able to deploy forces on another expeditionary operation. It is not sensible to deploy a capability just because the RCAF *can* deploy a capability and operate in a silo: if the operational situation does not warrant the capability or it can be provided more efficiently through other means, then there is no practicable reason for deploying it. Much like LGen Coates's point about operations that do not directly involve air activities should be "the result of an airminded decision," the decision to not deploy a capability should be the result of an airminded and "expeditionary minded" decision: a comprehensive understanding of RCAF capabilities and requirements of the operation.[11] As the "2 Wing Force Employment Concept" notes, an essential aspect of 2 Wing's concept of operations is, therefore, to develop and inculcate an "expeditionary mindset" within its personnel: "There is a requirement to continue the transformation to an expeditionary 'fighting spirit' within the RCAF. This entails the profound entrenchment and ongoing reinforcement of an expeditionary culture, focused on the uniqueness of aerospace operations in all RCAF doctrine, procedures, and plans."[12]

2 WING

Key to the RCAF's expeditionary capability in general—and 2 Wing in particular—will be avoiding the Canadian air force's previous ad hoc approach of deploying on

overseas operations. As the demands for expeditionary air forces increased at the end of the Cold War, Canada's air force tended to respond to crises in a "go with what you've got" approach. This ad hoc approach to and organization of RCAF units to enable overseas air operations proved problematic.[13] Although the air force was able to deploy overseas and make important contributions to expeditionary coalition operations, it did so largely at the expense of efficiency and at a high tempo of operations that put huge strains on its equipment and especially its personnel.[14] Oftentimes, Canada's air force has had to pull people and even entire units out of their wings all over the country to deploy overseas to fill capability gaps, which greatly hampered the productivity of the RCAF's main operating bases at home in Canada. Although the mission support squadrons (MSSs) were generated to deploy on expeditionary operations and one of the RCAF bases was dedicated to support operations and be ready to deploy, similar restraints still remained.[15]

Even though the RCAF was arguably able to "punch above its weight" during several campaigns (i.e., Op MOBILE) once in theatre, the ad hoc manner in which its forces deployed into the AO put a lot of strains on the RCAF. These deployments revealed many lessons learned regarding how to deploy on expeditionary operations—on how to "be" expeditionary—that have been incorporated into the 2 Wing concept.[16] Col Boucher's observations on how the RCAF deployed on Op MOBILE and how 2 Wing negates the ad hoc approach to expeditionary air operations are illustrative:

> It was an eye-opener when we sent the jets [to Italy] ASAP [as soon as possible]. When they arrived in Trapani they were in no-man's land—no ammunition, nobody there to set things up. 2 Wing deploys ahead to set the stage to enable air operations. In [the] Libya [campaign, the] lack of setup caused a lot of headaches. [By comparison,] 2 Wing can be just as rapid as the fighter jets with an AFAST [air field activation surge team] to do the initial coordination with the host nation. It can do the leg work setting the stage so that when the jets arrive they have a package with a hotel room key, a place to eat, and mission orders for the next day or so. And then [2 Wing] coordinates the airlift for all of the armament, fuel, etc., that are needed for air operations.[17]

The RCAF leadership came to an important decision, realizing that the existing ad hoc approach was not the best way for Canada's air force to conduct expeditionary air operations. In this unpredictable world, the requirement to be agile and flexible to deploy anywhere to tackle any kind of air power challenge is essential.[18] By "being expeditionary," 2 Wing provides this important capability for the RCAF and avoids the previous ad hoc approach.

While most RCAF wings are centred on aircraft, 2 Wing is different in that it focuses on the RCAF's ability to support a contingency on short notice by rapidly deploying self-sufficient forces into a theatre.[19] In contrast to the previous ad hoc approach, 2 Wing's agility and modular approach mean that it is well-structured and organized with equipment ready to deploy for any contingency.[20] 2 Wing takes care of the Roto 0

requirements when the RCAF deploys on expeditionary operations. This includes doing the original reconnaissance of the theatre to assess the situation and determine what will be needed for the RCAF to conduct air operations as well as establishing the initial requirements to set up a detachment, including bringing in any needed equipment, before elements from other RCAF wings arrive. In other words, 2 Wing avoids the previous ad hoc approach by being the "Vanguard of the RCAF" and deploying ahead to set the stage to enable RCAF air operations overseas.[21] 2 Wing has proven its worth by establishing Roto 0 for a number of RCAF operations and exercises. These have included: Op RENAISSANCE in the Philippines and Nepal, Op REASSURANCE in Romania and Lithuania, Op PROVISION in Lebanon and Jordan, Op IMPACT in Kuwait, RIMPAC, JOINTEX and even support to Op BOXTOP.[22] 2 Wing is mandated to "enable ATF operations during two simultaneous contingency operations."[23] Therefore, the 60-day limit on 2 Wing's deployment overseas also enhances the RCAF's agility by enabling it to deploy on more than one expeditionary air operation at a time.[24]

2 Wing's expeditionary concept and construct help address the RCAF's high operational tempo problem of the last couple of decades. For one, it alleviates the previous situation of pulling personnel from other RCAF wings. 2 Wing does not pull people from other wings because it is a self-contained organization with dedicated personnel ready to deploy rapidly in response to a crisis. In addition, because 2 Wing consists of scalable and modular units that can get out the door quickly and undertake the initial requirements to set up an ATF in theatre, it takes the burden away from other wings and units that previously had to react quickly to a contingency, which was characteristic of the previous ad hoc approach. As a specialized expeditionary unit/capability, 2 Wing, thus, directly supports Canada's domestic first-principle priorities by freeing up other wings to ensure the smooth functioning of domestic air operations instead of putting undue pressure on them to support a rapid overseas deployment.[25] Furthermore, part of sustaining an expeditionary force includes sustaining the tempo of operations.[26] This puts huge pressure on personnel, which we have seen has been a significant challenge for the RCAF in the past 24–30 years. 2 Wing helps alleviate this problem by giving deployed personnel a well-deserved break by having available qualified personnel and capacity to temporarily replace them in theatre. This helps alleviate the high-tempo problem because shorter deployments increase the RCAF's ability to reconstitute and result in better quality of life for personnel, thereby improving retention.[27]

2 Wing also has an important training function based on 2 Expeditionary Readiness Centre (2ERC) that enhances the RCAF's air-expeditionary capabilities. It not only trains 2 Wing personnel on how to deploy quickly and undertake the initial requirements to set the stage for overseas air operations but also provides expeditionary training to personnel from other wings to prepare them to deploy.[28] 2 Wing personnel are, therefore, the RCAF's expeditionary SMEs: they provide a specialized expertise in expeditionary operations to the rest of the RCAF. In doing so, 2 Wing provides needed "flying in formation" and air-to-air integration for the RCAF. Training personnel from across the RCAF requires that 2 Wing personnel have a broad understanding of RCAF planning,

each of the RCAF's operational communities and higher-level issues, thus resulting in a more holistic comprehension of Canada's air force as an air power institution. Moreover, as a key partner with joint expeditionary formations such as 1 Division in Kingston, 2 Wing provides essential airmindedness to joint task forces by integrating all of the CAF elements together and inculcating them with an air-expeditionary mindset.[29]

In fact, 2 Wing's capabilities have arguably enabled the RCAF to take a leading role in CAF expeditionary operations. Previously, the Canadian experience of expeditionary operations was "that the Navy leads, the Army defines, and Air Forces lend substance,"[30] and oftentimes, the RCAF was "unconsciously relegated to a support function that fills an important gap for the Army at the tactical level."[31] However, today 2 Wing's capabilities help counter this perception of the RCAF and the related "jarmy" focus of Canadian expeditionary operations. Moreover, Canada's joint partners have expressed their pleasure with how 2 Wing has allowed the air force to evolve over the years to go embrace operational-level thinking and be a more integrated and valuable contributor to joint operations.[32]

Part of 2 Wing's ability of being agile, modular and scalable (task-tailored) is having the capability to generate and deploy a high-readiness ATF that is also agile, modular and scalable based on the requirements of the mission.[33] Moreover, as LGen Hood mentions in this chapter's epigraph, the ATF concept is also interoperable with and complementary to NATO processes and procedures. This dynamic—combined with interoperability in a combined, joint and integrated context—is an essential aspect of 2 Wing's Force Employment Concept[34] and reflects the stated *Air Force Vectors* requirement to be interoperable coalition partners. Therefore, as LGen Hood notes, 2 Wing, empowered by the RCAF's ATF concept, provides an important contribution to an expeditionary endeavour with international partners by allowing "the RCAF to seamlessly interoperate in any combined or Joint Task Force."[35] In fact, NATO and other smaller coalition partners have taken notice of 2 Wing's concept and construct and have begun incorporating aspects of it into their own air-expeditionary concepts.[36]

RECOMMENDATIONS

Therefore, one important contribution that the RCAF can make to coalition operations is by presenting the 2 Wing concept as an air-expeditionary model for allied air forces to emulate. With 2 Wing, the RCAF, arguably, has a more advanced air-expeditionary concept than some allies. For instance, the RAF's expeditionary-air-wing concept mirrors the RCAF's previous MSS model, in that it is focused on certain bases (or in the RAF case, stations) being designated to be ready to conduct expeditionary operations. The difficulty is that this approach has resulted in the same constraints on the home base that the RCAF faced years ago; as one RAF station commander noted to Col Boucher, "the problem is that when we go out the door nobody stays behind to run the base."[37] 2 Wing's air expeditionary concept and construct, as we have seen, negate these challenges. Therefore, in addition to 2 Wing being an air-expeditionary model for other inter-

national partners, allied awareness of 2 Wing's capabilities could lead to the RCAF/Canada being chosen to take the lead to set up the initial rotation for smaller coalition expeditionary endeavours or for smaller coalition partners.[38]

As the "2 Wing Force Employment Concept" notes, "credibility is the 2 Wing centre of gravity."[39] Therefore, to realize the RCAF's AFEC project and to truly have a relevant and desirable air-expeditionary model for allies to emulate, it is essential that the build-up and expansion of 2 Wing continue so that it meets all of the AFEC project objectives. The MND has authorized and approved initial AFEC projects and the programme is progressing nicely. However, several projects only really commenced in December 2016, including the building of the main facility in Bagotville and additional facilities at Cold Lake. Even though it is capable of conducting contingency operations, 2 Wing still lacks infrastructure and equipment, which limits what it can do (i.e., it is not declared operational for austere field operations). It will not be until 2024 that the entire AFEC programme will be complete and 2 Wing will achieve full operational capability.[40] Therefore, until that time, progress on building and expanding 2 Wing according to the AFEC project objectives should continue without interruption to ensure that the RCAF realizes its full air-expeditionary concept, thus serving Canadian interests and being an enabler for overseas coalition operations.

NOTES

1. "Royal Canadian Air Force and NATO," 18.

2. Allan English, "Foreword," in English, *Canadian Expeditionary Air Forces*, 2.

3. Taylor, "Double Counting or Counting Double?," 32.

4. Located at CFB Bagotville, 2 Wing consists of approximately 350 members divided between a headquarters and five units: 2 Wing Headquarters, 2 Air Expeditionary Squadron, 2 Expeditionary Readiness Centre, 2 Air Component Coordination Unit (2 ACCU), 8 Air Communication and Control Squadron (located at Canadian Forces Base Trenton, Ontario) and 4 Construction Engineering Squadron (located at Canadian Forces Base Cold Lake, Alberta). Canada, DND, "2 Wing Backgrounder" (2 Wing Headquarters, CFB Bagotville, January 2017).

5. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 9.

6. Rachel Lea Heide, "Maintenance Considerations for a Canadian Expeditionary Air Force," in English, *Canadian Expeditionary Air Forces*, 96; Col Luc Boucher, Commander 2 Wing Bagotville; LCol Francis Mallet, CO 2 ACCU; Chief Warrant Officer (CWO) Martin Rousseau, 2 Wing CWO (interview by author, Canadian Forces Base Bagotville, QC, January 12, 2017); and Canada, DND, "2 Wing Force Employment Concept" (20 August 2014), 3. I thank 2 Wing Commander Col Luc Boucher for providing me with a copy of this document.

7. Kainikara, "Future Relevance of Smaller Air Forces," 3–4.

8. Canada, DND, "2 Wing Force Employment Concept," 3–4, 7. Col Boucher perhaps put it best: "the fact is that the Canadian Armed Forces and the air force in particular is so small that we need to optimize how we conduct business." Boucher, Mallet, and Rousseau (interview).

9. Boucher, Mallet, and Rousseau (interview); Zmud, "Transforming the Canadian Air Force," 101; and James Fergusson, "Over There, From Here: Expeditionary Forces and the Canadian Air Force," in English, *Canadian Expeditionary Air Forces*, 46–47. On the uniqueness of Canadian air force culture, see Allan D. English, *Understanding Military Culture: A Canadian Perspective* (Montreal and Kingston: McGill-Queen's University Press, 2004), 122.

10. Canada, DND, "2 Wing Force Employment Concept," 3. For instance, 2 Wing does not have the capability to build a completely new airfield. To do so would require a great deal of support and effort on the part of joint and/or combined partners. Instead, 2 Wing usually deploys to areas with basic infrastructure for air operations such as runways and tarmacs. Boucher, Mallet, and Rousseau (interview).

11. Coates, "Airmindedness," 78; and Boucher, Mallet, and Rousseau (interview). Part of the airminded aspect of the decision would be comprehension that other RCAF units / force generators will provide additional specialized RCAF resources (personnel, aircraft, knowledge, etc.) tailored to that particular mission. This is explicitly outlined in the 2 Wing Force Employment Concept. Canada, DND, "2 Wing Force Employment Concept," 3.

12. Canada, DND, "2 Wing Force Employment Concept," 2.

13. Gimblett, "Canadian Way of War," 15; Boucher, Mallet, and Rousseau (interview); Canada, DND, "2 Wing Force Employment Concept," iii, 2; LCol Pux Barnes, "The RCAF Air Task Force: The New Kid on the Block," *Royal Canadian Air Force Journal* 4, no. 4 (Fall 2015): 39, 45, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2015-vol4-iss4-fall.page; and Col Luc Boucher, "2 Wing Brief: RCAF Air Expeditionary Capability (AFEC)" (slide deck, January 12, 2017), slide 3. I thank Col Boucher for providing me with a copy of this slide deck.

14. Goette and March, "Transforming Canada's Post-Cold War"; and Heide, "Canadian Air Operations," 79–80.

15. Boucher, Mallet, and Rousseau (interview).

16. Barnes, "RCAF Air Task Force," 38, 45; Chris Thatcher, "Wings Over Romania: NATO Operation Bolsters Expeditionary Concept," *Vanguard*, August/September 2014, 13, accessed May 3, 2018, http://vanguardcanada.uberflip.com/i/392905-augsept-2014-v2; Mayne, "Canadian Experience," 261; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, O-6/7.

17. Boucher, Mallet, and Rousseau (interview).

18. Canada, DND, "2 Wing Force Employment Concept," 2–3; Canada, DND, *FAOC*, 9; Thatcher, "Wings Over Romania," 14; Boucher, "2 Wing Brief," slide 4; and Brad Gladman, "Considerations for Defining the Future of Canadian Air Power," DRDC Report DRDC-RDDC-2015-L223 (Ottawa: DRDC, 2015), 2.

19. Canada, DND, "2 Wing Force Employment Concept," 13–14; and Boucher, "2 Wing Brief," slide 11. As Canada, DND, "2 Wing Backgrounder" notes, "2 Wing is a key element of the Air Force expeditionary capability (AFEC) Program, whose mandate is to optimize the Royal Canadian Air Force's ability to rapidly deploy and effectively sustain operations in response to contingencies anywhere in Canada or around the world."

20. Boucher, Mallet, and Rousseau (interview).

21. Canada, DND, "2 Wing Force Employment Concept," 6. Whereas a deliberate operation is planned in advance of a known event, thereby permitting greater preparation time, a contingency operation is more reactive, requiring a quick response. 2 Wing specializes more in contingency expeditionary operations, while other wings in the RCAF have better capacity to plan for and conduct deliberate operations. Canada, DND, "2 Wing Force Employment Concept," Glossary.

22. Boucher, Mallet, and Rousseau (interview); and Boucher, "2 Wing Brief," slides 17 to 20. See also Barnes, "RCAF Air Task Force," 40–45; and Thatcher, "Wings Over Romania," 13–14.

23. Canada, DND, "2 Wing Force Employment Concept," 7.

24. Canada, DND, "2 Wing Force Employment Concept," 7.

25. Boucher, Mallet, and Rousseau (interview); and Canada, DND, "2 Wing Force Employment Concept," 6, 13.

26. Gongora, "Meaning of Expeditionary Operations," 23.

27. It also has the added benefit of giving 2 Wing personnel additional experience in expeditionary air operations. Gongora, "Meaning of Expeditionary Operations," 22–23; Boucher, Mallet, and Rousseau (interview); and Heide, "Maintenance Considerations for a Canadian Expeditionary," 94, 101. Another way that 2 Wing provides better quality of life is by having infrastructure to support personnel and their families. Canada, DND, "2 Wing Force Employment Concept," 7.

28. Canada, DND, "2 Wing Force Employment Concept," 9–10. For instance, 2 Wing trains all of the ATFs for Op IMPACT. Boucher, Mallet, and Rousseau (interview).

29. Boucher, Mallet, and Rousseau (interview); and Canada, DND, "2 Wing Force Employment Concept," 13–14.

30. Gimblett, "Canadian Way of War," 15.

31. Fergusson, "Over There, From Here," 51.

32. Boucher, Mallet, and Rousseau (interview).

33. Canada, DND, "2 Wing Force Employment Concept," iii, 5, 10–14; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 22; Barnes, "RCAF Air Task Force," 40; Canada, DND, *FAOC*, 4; and Boucher, "2 Wing Brief," slide 4. Col Boucher explains 2 Wing's employment of the RCAF ATF concept as follows: "the ATF concept is really how 2 Wing is formed to begin with. When you are deployed you have your ATF HQ, operational support element, mission support element, force protection element and then your flying detachment or intelligence cell. All of the bolt-on scalable elements will be part of the ATF, [while] second- and third-line support can come from joint or coalition partners." Boucher, Mallet, and Rousseau (interview).

34. Canada, DND, "2 Wing Force Employment Concept," 2–3.

35. Quoted in "Royal Canadian Air Force and NATO," 18.

36. Boucher, Mallet, and Rousseau (interview).

37. Boucher, Mallet, and Rousseau (interview).

38. Boucher, Mallet, and Rousseau (interview).

39. Canada, DND, "2 Wing Force Employment Concept," 6. See also the discussion of credibility in Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 14.

40. Boucher, Mallet, and Rousseau (interview); and Boucher, "2 Wing Brief," slides 2, 21.

10
Targeting

It is recommended that a CF targeting capability be developed that includes weaponeering, weapons effect and weapons modeling, in support of collateral damage estimation across the joint spectrum. This targeting capability should be deployed to augment a coalition targeting cell, or to provide direct support to the Canadian ACC [Air Component Commander].[1]

– BGen Derek Joyce

INTRODUCTION

As BGen Joyce's recommendation (based on Canada's experience during Op MOBILE) indicates, one potential niche that the RCAF should explore that will benefit coalition expeditionary operations is a targeting specialty. Indeed, such a specialty is reflective of the CDS's intent. Indicating that CAF will focus more on targeting in 2016, General Vance assigned Major-General (MGen) D. L. R. Wheeler as the lead for the CAF Targeting Implementation Initiative.[2] General Vance extolled the value of and placed greater emphasis on targeting. He is actively pursuing its utility in several ways, including, for instance, in operational planning and even in his messaging regarding Operation HONOUR.[3] LGen Hood echoed these sentiments, remarking that "targeting is about more than dropping bombs and not always about bombs at all; it's a way to think about and focus on what is most important within an operational environment."[4] In addition, the RCAF Commander also spoke about the RCAF "addressing a fully integrated joint targeting capability with an end state of seamlessly contributing to future NATO or coalition targeting efforts."[5] Furthermore, future CAF operations across the spectrum of conflict will most likely require targeting, which will be necessary both to support joint and coalition partners in any ground or maritime operation and to ensure human security, which is consistent with the MND's intent.

Although targeting has been designated a joint CAF capability and the Canadian Forces Warfare Centre at Shirley's Bay has been designated as CAF's centre of excellence,[6] much like the issue of ISR, the RCAF should develop targeting as an environment/institutional specialty.

Targeting is primarily an air power activity within the realm of air force capability and personnel expertise. Indeed, modern targeting's many advantages and challenges, some of which will be detailed in this chapter, have the same character of 21st century air power's advantages and challenges.[7] It is no coincidence that the officer selected to be the initial lead for the CAF Targeting Implementation Initiative was MGen Wheeler, an RCAF officer with extensive operational fighter and command experience, who in his previous position as Commander 1 Canadian Air Division and the Canadian Joint Force Air Component Commander (JFACC) had a broad understanding of and appreciation for RCAF capabilities and air power effects.[8] Targeting also requires very specialized training,[9] and the RCAF has the personnel with the most training in and experience with targeting, largely due to Ops MOBILE and IMPACT. Moreover, since Canada's air force is the most inherently joint of the environments, RCAF targeting expertise can be leveraged for the benefit of CAF writ large by permitting greater jointness of targeting. Furthermore, as Joyce's recommendation in the epigraph to this chapter alludes to, there is an opportunity for the RCAF to leverage a specialty in targeting in expeditionary operations in the form of a niche targeting capability that is interoperable with Canada's primary allies and could, thus, plug into allied/coalition CAOCs or perhaps, given focus and ambition, even see the RCAF lead allied/coalition targeting efforts.[10]

Achieving an RCAF expertise in targeting will not be simple due to its many intricacies. As the RCAF Aerospace Warfare Centre targeting SME, LCol Jeff "Boots" Lebouthillier, noted in his excellent "Joint Targeting Overview" webinar that "targeting is complex and has many moving parts. And even today after much involvement with targeting matters, I find myself continually learning."[11] Targeting consists of a variety of procedures, issues and challenges. Some (though not all) of these fundamentals of targeting are presented in the next section, while the third section addresses a few of the wider cognitive-social challenges related to targeting and strategic messaging. These issues should be key considerations for an RCAF targeting specialty.

COMPREHENDING THE FUNDAMENTALS OF TARGETING

An understanding of some of the doctrinal fundamentals will be an essential aspect of any RCAF targeting expertise. First and foremost, it is important to have a definition of targeting and what "a target" is. Targeting is defined in CAF targeting doctrine as the "process of selecting and prioritizing targets and matching the appropriate response to them taking account of operational requirements and capabilities."[12] Or, as Lebouthillier aptly and simply put it, targeting is "a way to think and focus on what's important."[13] A target, on the other hand, is defined in the doctrine as "the object of a particular action, for example, a geographic area, a complex, an installation, a force, equipment, an individual, a group or a system, planned for capture, exploitation, neutralization or destruction by military forces."[14] Lebouthillier again adds greater substance to the doctrinal definition, noting that a target:

> can be any person, place, or thing worthy of altering, neutralizing, or destroying to negate its adversarial function. Naturally, every prospective target

> has distinct characteristics which need to be identified before it is engaged. Commonly, this group of physical, functional, cognitive, environmental, and temporal markers is pooled and weighed to determine if it elevates from being simply interesting to becoming a target.[15]

Therefore, an RCAF targeting specialty will require a comprehensive understanding of the various procedures and processes such as the air tasking cycle; air tasking orders (ATOs); the joint targeting cycle; the targeting process; and, especially, the document that explains them, CAF joint doctrine B-GJ-005-309/FP-001, Canadian Forces Joint Publication (CFJP) 3-9, *Targeting*.[16]

An RCAF targeting specialty will also have to appreciate that there are important legal issues and considerations. All CAF personnel are subject to domestic and international laws, and as such, targeting must be consistent with B-GJ-005-300/FP-001, CFJP 3-0, *Operations*; the LOAC; and B-GJ-005-501/FP-001, CFJP 5-1, *Use of Force for CF Operations*. Specifically, there is a duty to distinguish between civilians and combatants as well as between civilian objects and military objectives (legitimate targets).[17] As Lebouthillier has noted, "from this group of legitimate military targets, military staff sort and prioritize the targeted persons, places, and things which would best achieve the commander's desired effect" according to enemy vulnerability and "high pay-off" determinants.[18] The specific obligations related to targeting include ensuring that objectives to be attacked are not entitled to special protection under the LOAC, taking all precautions in the choice of the means of attack to minimize collateral damage and refraining from launching any attack where the collateral damage would outweigh any anticipated military advantage (proportionality test).[19] All three considerations are necessary not only to maintain the moral high ground but also to respect domestic and international legal considerations—and especially repercussions if the legality of a strike is in question.[20]

As a result, the legal advisor (LEGAD) plays an important role for an RCAF targeting specialty. Legal advice is required throughout the targeting process, and Canada has an obligation at all times to ensure that LEGADs are available. The roles of the LEGAD are to support the commander / target engagement authority (TEA) with timely, solution-oriented, operationally-focused legal advice; apply relevant facts to the appropriate legal regime; be responsible to the Judge Advocate General; and be responsive to the supported commander/TEA.[21] So important now is the role of the LEGAD to ensure the legality and prosecution of a target that Canadian Broadcasting Corporation (CBC) reporter Terry Milewski, writing on Op IMPACT, reflected on the seriousness of modern targeting with a sense of humour:

> it's a wonder that the CF-18 pilots fighting ISIS [the Islamic State of Iraq and Syria] didn't take a LEGAD with them every time they took to the sky. One wrong move, and they could violate the LOAC by bombing something on the NSL [no-strike list] and end up on the wrong side of a CDE [collateral damage estimate].

> … It's enough to make you wonder if a LEGAD clings to every falling bomb, taking notes for the mandatory post-bombing reports.[22]

For similar reasons, it is not surprising that the Op MOBILE Task Force Libeccio end-of-tour report recommended that the LEGAD should have full-spectrum legal-advisory services, deploy with the RCAF headquarters unit / targeting team and remain with them for the duration of the campaign (i.e., in the CAOC). The report further recommended that for high-intensity campaigns more than one LEGAD should be provided to support targeting.[23] Indeed, the LEGAD is a key advisor who supports the in-theatre commander or TEA, yet it must also be remembered that it is the in-theatre commander / TEA who has the final say on and command authority regarding whether Canada will accept targets.[24]

Expertise in non-kinetic targeting is also essential for an RCAF targeting specialty.[25] It can include the use of non-lethal weapons/munitions[26] and non-kinetic air power effects (such as a show of force, dropping leaflets and deterrence).[27] However, non-kinetic targeting also includes a range of joint capabilities and effects (including those in addition to air power effects) and is not always focused on adversaries. It can consist of capabilities such as information activities, computer-network operations, key-leader engagement, lawfare, criminal legal action, psychological operations, security detection, assets freezes and cyber operations. Non-kinetic targeting offers additional means to conduct operations.[28]

Since kinetic targeting and non-kinetic targeting are intertwined, they can be applied on the whole spectrum of conflict—thus resulting in full-spectrum targeting. Non-kinetic targeting is also not exclusively an adversary-centric notion, as the "target" can be an enemy, unfriendly, neutral, friendly, allied, supporters of both sides and domestic audiences. This requires not only cultural understanding of possible effects but also careful attention to the messaging or the narrative one wants to get out to one's "target audience" as well as getting ahead of the enemy to ensure that one's message is communicated first and most effectively.[29] Adversaries, to counter their inferiority in kinetic conventional capabilities, will engage in non-kinetic targeting. Whereas non-kinetic targeting may support our main kinetic effort, the opposite is true for adversaries: the non-kinetic aspect is their main effort and kinetic actions are in support.[30] This requires empathy: RCAF targeting experts will have to increasingly keep non-kinetic targeting in mind because adversaries are using it against us—largely, but not wholly, due to the West's traditional asymmetric kinetic (and conventional) superiority. Moreover, a non-kinetic targeting approach will also prove necessary for any Canadian PSO mission in which rules of engagement (ROE) may be restricted. Lastly, however, RCAF targeting experts will have to understand that non-kinetic targeting, and especially the use of non-lethal weapons, is "neither a panacea nor a substitute for lethal force"[31] needed in certain operational situations.

The RCAF needs to understand and appreciate the essential relationship between ISR and targeting as well as, in particular, that having the best intelligence possible supported by robust ISR is essential for accurate and effective targeting.[32] As air power theorist John Warden remarked in 1990, "the key to air power is targeting and the key to targeting is

intelligence."[33] Appreciation for the key relationship between ISR and targeting would include consideration of the huge effort that goes into collecting, processing, exploiting and disseminating intelligence for targeting. It would also entail the realization that the RCAF simply does not have the capacity to pursue a full ISR-capability enterprise model along the lines of USAF.

An RCAF targeting specialty would mean that RCAF personnel would have the expertise to support operational planners in terms of weaponeering, target analysis and targeting-restriction awareness.[34] Weaponeering, in particular, would entail an essential comprehension of the requirement for low collateral-damage weapons with lower yield bombs to minimize the risk of unintended harm to civilians and their property. Such weapons would be especially vital in reducing the weapon's footprint "in urban and politically sensitive operations with reduced likelihood of unintended weapons effects," a necessity in this casualty-averse age.[35] The challenges of measuring effects on targets and in particular battle damage assessment (BDA) would also be important aspects of an RCAF specialization in targeting.[36] Another consideration would be targets on the restricted target list (RTL); that is, leaving a potential target alone if it is determined that there is more value in not disturbing it (i.e., intelligence gathering) than influencing or destroying it—in other words, to determine what is the most desired effect.[37]

In undertaking a targeting specialty, it is important for the RCAF to champion the traditional air power tenet of centralized control and decentralized execution by emphasizing that the most effective way to conduct targeting is with a mission-command approach.[38] For instance, the Canadian Expeditionary Force Command (CEFCOM—precursor to today's CJOC) granted RCAF targeting authorities (red-card holders or TEAs as they are now known) working in the CAOC during Op MOBILE greater freedom of action than the TEAs who were deployed to the CAOC during Op IMPACT. This higher level of constraint resulted in less-effective Canadian targeting and an "undesired second-order effect of damaging credibility and coalition cohesion."[39] LGen Bouchard's words are instructive on this issue of mission command: "Commanders must be given appropriate levels of responsibility to make decisions … if you don't have confidence in them, you did not train them effectively … stop trying to run an operation with a 5,000 mile screwdriver from Ottawa."[40] This mission-command issue suggests that an RCAF expertise in targeting would benefit CJOC and its relationship with RCAF targeting staff plugged into an allied/coalition CAOC to conduct Canadian targeting. The key is to ensure that—in addition to having RCAF targeting experts working in the CAOC—other RCAF targeting experts with an understanding of how a CAOC works are assigned to CJOC as part of its Strategic Targeting Directive. These RCAF experts could fulfil an important SME role that could avoid friction with RCAF targeting experts deployed into a coalition CAOC; lead to a greater understanding of and appreciation for targeting in CJOC; and ideally, result in greater trust as expressed through greater mission-command flexibility for those conducting targeting in the overseas CAOC.[41]

A related requirement for an RCAF targeting specialty would be understanding the differences between deliberate and dynamic targeting and, especially, the value and

appropriateness of the latter in modern warfare. Whereas deliberate targeting entails targets that are known to exist (in that they are identified, located and placed into the planning phase—usually an ATO), dynamic targeting focuses more on (usually high-value) targets of opportunity that are unplanned; present themselves during the undertaking of a mission; and usually, require quick prosecution.[42] Whereas previously it was deliberate targets that dominated, now upwards of 90 percent of targets are dynamic.[43] Moreover from a joint perspective, in modern operations, land forces rely a great deal on air power to respond to time-sensitive targets, which are usually dynamic in nature.[44] Indeed, just as flexibility is the key to air power, flexibility in targeting is also essential, as was demonstrated during OUP when allied forces had to adapt to the adversary switching from conventional to non-conventional tactics.[45] Unfortunately, the mission-command restrictions have hamstrung recent RCAF dynamic targeting.[46] This necessitates a greater understanding of dynamic targeting on the part of RCAF targeting experts so that they can, as SMEs, explain to senior headquarters personnel and officials the essential value of greater flexibility in prosecuting dynamic targets.[47] Indeed, an RCAF niche in prosecuting dynamic targets would be an essential and highly valued contribution to coalition expeditionary operations.

An RCAF targeting specialty will also require an appreciation of the complexities of modern targeting, as it relates to various bureaucratic requirements and restrictions. This takes into account the complex lexicon of targeting, which Milewski described as "a hyper-cautious world of bureaucratic acronyms."[48] It also includes due diligence in an often lengthy vetting phase of the target-development process to validate a target to confirm both its legality and that it meets the commander's intent.[49] As Milewski notes, questions to be asked include: "Is this bombing militarily necessary? Is the damage proportional to the benefits? Has the target been approved by the coalition? By the intelligence officer? By the legal adviser? By the Targeting Engagement Authority?"[50] In addition to determining what *can* be targeted, targeting also addresses what *cannot* be targeted. This includes developing an NSL, which Lebouthillier defines as "a list of all identified objects within a specified geographical area, country or AO, functionally characterized as non-combatant/civilian in nature."[51]

The lack of adversary anti-air capabilities has resulted in a permissive environment in modern warfare and has allowed Western forces to be much more discretionary in their targeting, but this situation can be problematic. For example, some critics, such as RAF Wing Commander R. A. C. Wells, have argued that this has resulted in "Air Power [getting] lazy as the number of self-imposed constraints gave the initiative to the forces and events on the ground rather than to an aggressive air strategy."[52] There is also the challenge, demonstrated by OUP, of relying on host-nation forces for targeting information. For instance, some (notably rebel groups) either do not understand or simply do not adhere to the LOAC and Geneva Convention, while a related issue is that the means by which they observe and pass on information makes corroboration of data upon which targeting relies very difficult.[53] Additionally, as mentioned earlier in this study, the issue of complacency of operating in a permissive environment is also relevant

in that it is unlikely that the RCAF and other Western forces will have the same level of freedom of action to conduct targeting and prosecute targets—including exercising a high level of discretion—in an A2/AD scenario.

To develop a targeting specialty, RCAF personnel will also have to have a deep understanding of various coalition restraints and challenges regarding targeting. For instance, national policy disparities of different states (such as divergent maritime boundary claims) may limit where a particular nation's forces are able to operate. The most obvious coalition targeting restraint/challenge, however, has to do with the issue of the recent "politicization of targeting"[54] phenomenon in terms of various red card holder (or TEA in the Canadian targeting lexicon) issues related to national caveats and ROE that have to be addressed when targeting specialists are deployed into an allied/coalition CAOC.[55] More often, red-card issues have to do with legal and political concerns; national targeting guidance can vary, meaning that certain nations will not do certain things (including Canada), and this places limits on their ROEs and targetwing contribution to the coalition effort. Oftentimes this has to with differing legal interpretations related to proportionality—countries that are reluctant to strike targets that may result in unacceptable collateral damage and/or may infringe the LOAC may hold up a red card. For instance, there are limitations on Canada's use of cluster munitions, while other countries do not have such limitations.[56] Since command of the RCAF in expeditionary operations will always remain with Canada and targeting will also remain a Canadian decision,[57] RCAF targeting experts represented in an alliance/coalition CAOC will always have to take red-card-holder political considerations and Canadian interests into account. A good example is OUP, where national caveats and red-card-holder issues meant that only the forces from a small number of countries were able to prosecute the most high-value offensive strikes against targets,[58] with these countries informally becoming known as the "striker club."

National capability limitations and national cultural issues (and in particular how they could restrain an allied/coalition targeting venture) must be understood. For instance, during the set-up of OUP in 2011, coalition leaders faced a personnel shortage "due to the forthcoming NATO Summer holiday period."[59] In a coalition, different nations can see the situation and potential end states differently, and this factor combined with broad and oftentimes varying political guidance can complicate targeting planning.[60] Additionally, not all coalition partners will have the same level of capabilities needed for them to fully participate in a targeting endeavour, and so RCAF targeting experts, especially those doing planning, need to take such limitations into consideration.[61] Where classification and intelligence-access limitations permit, RCAF targeting experts should have as much of an open-door policy as possible and include as many—and ideally all—of the contributing nations as possible in the allied/coalition targeting venture. Although, at times such a policy could possibly complicate and slow down the targeting process, it can reap many more dividends, including buttressing what LGen Bouchard identified as the OUP centre of gravity: the cohesion of the coalition.[62] The following account of that NATO-led campaign is illustrative:

> The ISR division chief overcame initial reservations about preplanned targets by including the senior national representatives in the initial efforts of the joint targeting working group. This initiative ensured that by the time the CJTF [Combined Joint Task Force] commander approved a target and put it on the joint prioritized target list, national questions and concerns had normally been addressed and the striker nation was prepared to engage the target. Many of the smaller striker nations deservedly received accolades because they did indeed punch well beyond their weight.[63]

Clearly, conducting targeting in a coalition environment can be complex, thereby requiring careful attention for the RCAF if it desires to develop a targeting expertise.

Concerns over collateral damage and the legality of a target can result in varying levels of red card holder / TEA authority, oftentimes resulting in greater centralization of control. Lebouthillier captures this best: "TEA levels of authority are ideally delegated to the command-and-control agency that has the best information or situational awareness; however, in the case of sensitive targets or those likely to incur problematic collateral damage, TEA is often retained at a high level of command."[64]

A related issue is that differences in the levels at which targeting approvals are set by particular countries may also be a complicating factor in a coalition construct. In particular, reaction time due to reachback requirements may be a key consideration in coalition targeting efforts. While one partner of a coalition may be able to quickly approve a targeting request at a relatively low level, another partner may require a significant lead time to complete their internal approval process (which may include governmental approval).[65] Policy differences, reflected in ROE or other strategic policy documents, "may mean that a multinational partner will refrain from entering certain waters or attacking certain military objectives."[66] Additionally, national security restrictions regarding access to intelligence and classified information networks can also prove problematic. For instance, as Mayne notes writing on Op MOBILE, these challenges "meant that not all nations were in a position to see each other's raw data. Without firsthand access it was, at times, difficult for some countries, such as Canada, to determine whether a nominated target met national requirements."[67] Although operating in a coalition can be frustrating for targeting teams and commanders prosecuting a campaign, the reality of modern targeting is that these difficulties are necessary to ensure that a country adheres to its national laws and safeguards political interests.

TARGETING AND STRATEGIC MESSAGING IN THE "NARRATIVE WAR"

> *We now have to put as much effort and competence into intelligence and targeting, as into the flying itself. Hence, the "where" and "why" deserve at least as much consideration as the "how."*[68]
>
> – Lieutenant Colonel Harald Høiback, Norwegian Air Force

As Lieutenant Colonel Høiback's epigraph demonstrates, RCAF targeting expertise should understand not only how to conduct targeting but also where and why. The "where" aspect concerns the issue of precision, while "why" addresses the socio-cognitive aspects of air power as they relate to strategic messaging or the narrative war / battle of narratives.[69] It is, therefore, necessary to go beyond the fundamentals of targeting and think outside the box by addressing the more social-cognitive issues related to strategic messaging and narratives. Doing so will ensure that an RCAF targeting expertise includes a wider comprehension of the various relevant aspects and challenges of modern targeting in today's complex security and defence environment. Moreover, the issues addressed in this section are ones inherent in not only targeting but also air power itself and, therefore, should be key considerations for any kind of RCAF expertise in targeting.

There is a specific RCAF requirement—and public expectation—that air power's targeting should be precise, accurate and avoid collateral damage.[70] It is, therefore, important to define collateral damage.[71] CAF targeting doctrine gives the following definition: "Inadvertent causalities and destructions in civilian areas caused by military operations."[72] Australian air power academic Kainikara also provides a useful definition: "collateral damage is a term generally used to denote unintended damage, injuries or deaths, especially to non-combatants and civilian or dual-use infrastructure, caused during combat operations in a conflict situation."[73] It is, however, in Lebouthillier's articulation of collateral damage where we see evidence of the most important concern, the impact that tactical actions can have on strategic goals: "This holistic process combines the ring of probable physical destruction with the projected cultural, religious, and political impact to ensure engaged targets will achieve *both short and long-term military objectives*."[74] [emphasis added]

RCAF targeting experts should, therefore, not only understand *that* collateral damage must be avoided but also fully grasp *why* it must be avoided. This entails full comprehension of the reality that one action at the tactical level inadvertently causing civilian casualties can have massive strategic and political ramifications.[75] As Kainikara notes, "collateral damage caused by even a single action at the tactical level can very rapidly deteriorate into strategic level convulsions leading to unwanted, and perhaps unwarranted, political interference in the conduct of a campaign."[76] Great care must be taken to avoid collateral damage lest the RCAF be labelled unfairly as wrongdoers.[77] A comprehensive understanding of the connection between the tactical action and strategic consequences will, therefore, be a necessary requirement for any RCAF targeting expertise.

Collateral damage concerns include the phenomenon of increased politicization of targeting, which results in more restrictions and greater control from the strategic level on those responsible for targeting and prosecuting targets. Moreover, such restrictions and greater strategic control could be put in place either before commencing a campaign (due to sensitivity to collateral damage) or during a campaign (as a result of collateral-damage incidents). Either way, both instances result in a loss of authority for operational and tactical commanders as well as reduced military effectiveness. These instances could also weaken a nation's public will to continue either a targeting venture or the entire

campaign itself, leading to the withdrawal of a nation's forces.[78] Both outcomes would have a negative effect on the coalition targeting effort and the multinational campaign. Any RCAF targeting expertise should, therefore, have a clear understanding of not only the tactical and operational aspects of targeting but also the sociocultural, strategic and political issues.

An RCAF expertise in targeting should, thus, include a wholesome comprehension of the complex subject of collateral damage and how it is influenced by the phenomenon of casualty aversion. This delicate subject has seriously impacted today's society, highlighting a requirement to understand its potential to dissuade Western societies from prosecuting military campaigns.[79] There are essentially three types of casualties as they relate to casualty aversion: the casualties of one's own forces (i.e., blue-force attrition), civilian casualties, and adversary / enemy combatant (red force) casualties. Usually the main focus of casualty aversion has been on the first two types, that is trying to avoid "friendly" casualties by keeping civilians and blue-force units and personnel safe from harm. For instance, in addition to the UNSCR 1973 mandate centring on protecting civilians, the concern over civilian casualties during OUP was such that it designated a "zero civilian casualty" campaign.[80] Civilian casualties can have huge strategic consequences, as this example from the Afghanistan conflict demonstrates:

> In Afghanistan, civilian casualty avoidance has become a central warfighting requirement. The tactical directive governing the use of force acknowledges that civilian casualties have "strategic consequences" and calls the protection of Afghan civilians "a moral imperative." It states, "*Every Afghan civilian death diminishes our cause*. If we use excessive force or operate contrary to our counterinsurgency principles, tactical victories may prove to be strategic setbacks."[81] [emphasis in original]

In addition, blue-force casualties can prove psychologically damaging to one's campaign. Kainikara argues that the Western "risk-avoidance security strategy"[82] to avoid casualties is a "national ethos"[83] that has been "seen by the non-Western world as the Achilles heel of Western military forces."[84] This problem is particularly acute for air forces, as air power's huge asymmetric advantage of being able to strike from the air largely without risk of attrition due to a generally permissive environment results in an expectation of zero air force casualties. Therefore, in the rare cases when such casualties occur, adversaries are able to make huge propaganda victories (i.e., shooting down the "invincible" or "untouchable" aircraft).[85]

Professional militaries are typically casualty averse, in that they want to avoid both attrition of their own forces and civilian deaths. This is also the case with the general public, who also desire that military forces avoid blue-force and civilian casualties.[86] However, arguably, there is a recent phenomenon that society's expectations of precision and accuracy in air power apply not only to blue-force and civilian casualties but also to adversary casualties. Put differently, such are the high expectations that militaries fight a "clean," "humane" or "antiseptic" war[87] that the public is increasingly expecting war without any casualties, friendly or otherwise: a war with zero human cost.

An RCAF targeting specialty will be essential for strategic messaging and articulating narratives to explain the importance and utility of air power to Canadian politicians and the public. It needs to go beyond simple information operations, which largely focus on the "various means to affect the will, the behaviour and the capabilities *of an adversary*,"[88] [emphasis added] by looking closer to home to guarantee political and public support for RCAF targeting endeavours. In other words, RCAF personnel must have an appreciation for the strategic "target audience" that is in the background of all operational targeting endeavours. In addition to standard RCAF public-affairs efforts, the RCAF must conduct a robust "target-audience analysis" focused on "sociocultural and cognitive dynamics"[89] of the Canadian public to successfully fight the narrative war at home to secure greater freedom of action in its exercise of Canadian air power. Shoring up home-front support by ensuring that RCAF air power transcends the public will go a long way in permitting Canada's air force to conduct expeditionary air operations that not only serve Canadian interests but also provide a valuable contribution to a coalition campaign.[90]

The narrative war is not fought on the traditional battlefield but in the cognitive domain and oftentimes in the court of public opinion.[91] It is conducted within what renowned British historian and strategic studies professor Sir Michael Howard has called the social dimension of strategy.[92] One aspect of targeting rightly focuses on the hearts and minds of the indigenous populations within the expeditionary theatre of operations. It has proven to be a difficult social-dimension challenge, and Western nations have dedicated much blood and treasure towards this purpose.[93] However, Western nations have, arguably, overlooked their own "home game" by giving insufficient attention to the hearts and minds of their own people when it comes to public support for expeditionary operations. Not enough consideration is given to what is, arguably, Canada's (and, it could be argued, the West's) centre of gravity: the national will of the public (i.e., domestic hearts and minds).[94] As US Army General Stanley McCrystal famously remarked regarding the war in Afghanistan, "air power contains the seeds of our own destruction if we do not use it responsibly."[95] Although primarily focused on Afghan hearts and minds, arguably, it is equally applicable to Western hearts and minds. This neglect of our own centre of gravity is a critical reason why the West is losing the narrative war with its adversaries.[96]

By contrast, these adversaries have been very adept at targeting our centre of gravity. In particular, they have become very skillful at perpetuating both real and perceived collateral damage.[97] These adversaries are, of course, not themselves adherents to customary international law or the "norms" of the conduct of war (i.e., adhering to the LOAC or the Geneva Convention, discriminating between civilians and combatants, proportionality in the application of force, etc.) like nations such as Canada. Yet, they have been able to capitalize on both Western ROE limitations meant to minimize collateral damage as well as several myths and misconceptions regarding air power and targeting by quickly and effectively perpetuating disinformation and false narratives for domestic but also Western public (and political) consumption.[98]

Adversaries have also used Western casualty aversion and limits on ROEs to their advantage by mixing in with, hiding in, locating strongpoints in and conducting

operations in densely populated public places. They do this not only to avoid detection but also because they know that Western militaries will likely not target them due to the risk of collateral damage—particularly civilian casualties. Indeed, adversaries even go so far as to actively conduct kinetic operations and use human shields, either confident that Western forces dare not target them for fear of harming or killing innocent civilians, or to provoke a strike with the understanding—and even expectation—that they will die as martyrs along with the civilians. They do this appreciating that such civilian deaths will result in a collateral-damage political disaster for the Western military force and, of course, will "reinforce the image of regular military forces as ruthless aggressors who deliberately target innocents," thus providing an excellent piece of propaganda material to exploit for their narrative.[99] Such defeats in the narrative war can and have resulted in the loss of public, and by consequence government, will to support missions/campaigns.[100] An RCAF targeting expertise should, therefore, fully appreciate how adversaries are able to perpetuate false collateral-damage claims and distort the very rare cases of Western collateral damage to support their own strategic narratives.

An RCAF targeting expertise should appreciate that with the "precision revolution" of precision guided munition (PGM) technology there is a societal *expectation* of precision.[101] The advent of PGMs has given the West a huge asymmetric advantage over adversaries in the 20th century. As the proportion of PGMs used increased from 8 percent in the First Gulf War to 100 percent in OUP, air forces have become accustomed (and even mandated) to employing—and the public has become accustomed to expecting them to employ—only PGMs.[102] As Dutch Air Commodore Frans Osinga put it, precision (PGMs and targeting) "has become the defining and normative feature of the Western way of war."[103] USAF Captain John Glock echoes this sentiment, noting that "an enduring lesson learned about delivery accuracy during the last eight decades is that the greater the accuracy of our weapons, the more accurate we need our targeting to be."[104]

Additionally, RCAF targeting expertise should be cognizant of the challenges posed by modern media depictions of RCAF air power and targeting. Of particular concern is how they will latch on to the more sensationalist and negative aspects of targeting (i.e., the very rare cases which result in civilian casualties resulting in collateral damage) instead of the fact that air power professionals go to great lengths to conduct legitimate targeting and avoid civilian casualties and collateral damage. In this information age, the RCAF is under increasing observation and public scrutiny. Once termed "the CNN effect," this scrutiny has expanded from politicians and the mainstream media to include other organizations/actors such as NGOs, bloggers as well as groups and individuals (including adversaries) using social media.[105] Such is the competition in today's 24-hour news cycle that oftentimes information is published "that is sensational and has great media appeal but ends up being basically wrong."[106] Most often the media, as Jim Corum notes, unwittingly reports such misinformation (the difference between "misinformation" and "disinformation" is described below) but also does not do their due diligence (largely due to the pressure to be the first to make headlines) to check and verify facts and to understand the military situation, or they simply rely "on highly biased informants or material."[107]

Although there are reputable news agencies that are more objective in their reporting on Western air power and targeting, there are also some that have an anti-Western and anti-NATO bias. It affects how they report on air power and targeting as well as, by extension, influences public opinion and government decision makers.[108] Included in this grouping are NGOs, most of which "are well-intentioned, [but] they often lack a sense of objectivity."[109] Corum elaborates:

> A number of NGOs tend to portray Western armed forces negatively, having a strong bias against the use of any force in general and NATO's use of force in particular. Some groups present well-researched reports and balanced assessments of events; however, others have a blatant bias and present corrupted data that is useless to support serious analysis. In particular, when it comes to civilian casualties caused by Western military operations, the figures can vary widely.[110]

The popularity of the Internet and social media in today's society only adds to the RCAF's challenge in the narrative war. They are other methods for proliferating exaggerated, distorted or false information about air power and targeting.[111] Understanding the challenge of modern media in this information age and, in particular, comprehending how it can influence public (and political) opinion about air power and targeting should, therefore, be an important feature of any RCAF targeting expertise.[112]

One of the challenges of countering the adversary in the narrative war is that of speed. Adversaries have the ability to "move quickly and efficiently to get their side of the story out to their audience on the internet, using well-crafted websites and social media,"[113] while Western nations have to go through a meticulous, lengthy process and public-affairs system to release information online.[114] Using a Canadian example, reporter Milewski notes the lengthy process for CBC to get access to the RCAF's fragmentary order (frag O) targeting document, remarking specifically that "these folks really don't want to rush into anything."[115]

Another requirement for RCAF targeting experts is a clear grasp on proportionality: the careful balance of risk between collateral damage, mission success and force protection / safety.[116] Such is the importance of optics at the strategic level that restrictions have been placed on modern targeting that have sacrificed operational efficiency to ensure that the correct image of "be[ing] seen to hold the moral high ground and be doing the 'right' thing" is communicated to the public.[117] There is also a coalition dimension to this problem. There needs to be recognition that even though increased restraint in targeting and the prosecution of targets may result in less tactical or operational combat effectiveness, it may be more beneficial strategically in terms of avoiding politically sensitive collateral damage and ensuring coalition cohesion.[118] However, it must be noted that in a possible A2/AD situation Western forces will likely not have the luxury of such restraint or discretion in their targeting due to the highly contested nature of the operational environment. Whether this would lead to greater freedom of action is hypothetical, but planners must prepare for this possibility.

An RCAF targeting expertise also has to include modesty and be realistic regarding what air power and targeting can and cannot do, so as to avoid making unrealistic promises. Air power is advantageous in that it is flexible and adaptable, but it is not a panacea that can ensure zero civilian casualties.[119] As Høiback states, "the fact that our opponents try to hold us against impossible standards is part of the expected propaganda war. Another question entirely is why we aim at such unattainable standards. Why do we aim for the impossible?" and that "everything, including Air Power, has its limits."[120] The problem is that while Western air forces have endeavoured to be precise and avoid collateral damage (especially civilian casualties), the reality of the Clausewitzian fog and friction of war means that on very rare occasions this is simply not achievable and there will, unfortunately, sometimes be civilian casualties.[121] As Kainikara notes:

> There will always be collateral damage, even if it is miniscule, when military forces are engaged in conflict, regardless of the nature of the adversary and character and conduct of the campaign. This is so, irrespective of the best intentions of the force to minimise collateral damage and the technological sophistication in the application of force. This is an irrefutable fact of life.[122]

There must also be an understanding that the kinetic use of air power can have positive effects. Høiback's words are again instructive:

> It is of course self-evident, but some people seem to forget this: bombs, even precision guided bombs, destroy things. Consequently, you cannot build things or nations with bombs. Occasionally, however, what bombs can do is ward off aggressors and contribute to a safe environment for the building to occur. Even if bombs destroy things, they indirectly assist those who are building a better future.[123]

These targeting experts need to not only understand and appreciate such realities of air power and targeting but also be able to communicate these realities to the public and government.

Therefore, an RCAF targeting expertise should engage in the narrative war by contributing to a public understanding of the RCAF's prosecution of ethical, proportional, moral and humane targeting. Put differently, how can the RCAF articulate the legitimacy of targeting to the public? The first part of this effort is refuting disinformation, falsehoods and myths about targeting and air power perpetuated by adversaries or (often unwittingly) the media, while the second part entails perpetuating positive RCAF targeting stories to ensure that they dominate the news cycle instead of the negative ones. For instance, Kainikara remarks that there is a "perception of air power as the biggest culprit in creating collateral damage"[124] and that "justly or unjustly, the immediate mental picture formed in the mind of the general public when collateral damage is mentioned is that of an air strike gone terribly wrong."[125] Such perceptions are false,[126] yet the problem will not go away anytime soon. RCAF planners will, therefore, have to take these perceptions and false accusations about air power and targeting as well as their political impact into

account when conducting a campaign. Moreover, an RCAF targeting expertise should include studying approaches to mitigate such perceptions and counter falsehoods as part of the narrative war.[127]

Part of the problem is that air power has unwittingly become a victim of its own success. As Høiback remarks, "Western Air Power has become so capable, efficient and accurate (so strong) that it is in danger of working against us. Not physically, but mentally."[128] Air power has become the option of first choice for governments due to the inherent advantages of air power's characteristics of speed and reach. It offers the ability to strike targets accurately, with precision, with minimal collateral damage and with no casualties to the aircrew. It has, therefore, become a major asymmetric advantage for Western forces.[129] However, along with this advantage has developed the idea that "the new-found survivability of Western air power makes it seem rather unheroic and unfair."[130] Is it really fair, this line of reasoning goes, to have the ability to strike someone or something from the air with no risk to oneself? Certainly, our adversaries have grasped onto this false line of thinking. In their disinformation campaigns, they had depicted the West's air power asymmetric advantage as "an inhumane means of waging conflict"[131] and "attacks from the air as ruthless, indiscriminate, inhumane, immoral and illegal"[132] in an effort to make "it politically impossible for democracies"[133] to employ air power and capitalize on its inherent advantages.[134]

One of the greatest ironies of modern air power, air power academic Corum has noted, is that Western air power and targeting have been restricted by rules, the LOAC, etc., while "the enemy may violate laws and international norms with impunity to further their cause."[135] Corum, who is head of the NATO Joint Air Competence Centre's Airpower and Disinformation Study, has identified a serious shortage in NATO strategic-communication capabilities to counter adversary attempts to perpetuate disinformation and misinformation about air power as well as to turn the tables by explaining to the public the legitimate use of air power. He defines disinformation as "the deliberate distortion of events and creation of false narratives disseminated by state or non-state actors with the intent of putting their enemy in a bad light, undermining the morale of enemy and bolstering the morale of one's own public."[136] Misinformation, Corum argues, "consists of exaggerated stories that normally have some elements of truth but have become, mostly through error and poor media practices, broadly distorted and often barely reflect the original factual events."[137] An RCAF expertise in targeting should address the misinformation and disinformation challenge.

One way that will help the RCAF articulate the legitimacy of its targeting is by taking a serious look at its terminology to ensure that its message can be clearly communicated to the public. The military's perpetuation of jargon and, especially, acronyms in its lexicon is notable, and arguably, this is especially so for targeting lingo which tends to be particularly confusing to the layperson. CBC reporter Milewski addresses the challenge of communicating targeting to the Canadian public in his article about Canada's bombing bureaucracy. In bringing this issue *to* light Milewski also *makes* light of it, but in doing

so underscores how important strategic communications is in the targeting narrative war. A few excerpts are illustrative:

- "Pity the military bureaucrat, buried in acronyms. Even the most intrepid clerk may remember his ROE and STD but forget to check his TSS/TEA with a LEGAD from the OJAG. It can happen to anyone."

- "The LOAC is the law of armed conflict and the NSL is the no-strike list. A CDE is a collateral damage estimation. Watch out for those."

- "It takes a while to translate it all from military lingo into English. Start with the title of the document. It's a FRAG O.

  Yes, a FRAG O. Amending a previous OP O."[138]

Communication requires comprehension on the part of the one receiving the message, so simplifying the targeting language for the layperson is necessary for the RCAF to articulate its narrative to the Canadian public.

RCAF targeting experts—and the RCAF in general—should always ensure that targeting and the employment of lethal air power is carefully orchestrated and, in particular, that it uses air power with discrimination, proportionality and accuracy. As Kainikara has noted, whereas the discriminatory use of air power can provide huge dividends, its indiscriminate use "can create issues at the strategic level that could have long term political ramifications."[139] The irony is that the RCAF goes to great lengths to ensure discrimination, proportionality and accuracy, but it is the extremely rare—and sometimes blatantly false—reports of collateral-damage civilian casualties that dominate the news cycle and are seared into the minds of the Canadian public. Corum argues that air forces should not only "take care to document and publicize the human rights violations of its adversaries"[140] but also strategically communicate to the public about the care, due diligence, professionalism, legitimacy and adherence to the LOAC that they take when targeting and prosecuting targets:

> It is essential to recognize that the main issues used by both state and non-state NATO adversaries, namely human rights and civilian casualties, actually play to NATO's strengths. NATO's adversaries essentially have no regard for human rights or the lives of civilians and the key focus of NATO Strategic Communications must be to emphasize the care that NATO takes to protect civilians and follow the laws of war.[141]

Educating the public about air power and targeting—and especially highlighting the fact that air-force targeting professionals go to great lengths to ensure that what they do is ethical, legal and legitimate—is one way that RCAF targeting experts can contribute to winning the narrative war.[142]

There should, therefore, be a heavier focus on RCAF targeting experts perpetuating positive accounts of the RCAF conducting "clean" targeting and target prosecution to the Canadian public. For instance, LCol (now Col) Darcy Molstad noted in 2011 regarding OUP that "public reports of CF-18s not dropping weapons due to collateral damage concerns confirmed that, in spite of low experience levels, Canadian aircrew were exercising a high degree of discretion and professionalism in a very sensitive operation."[143] In addition, BGen Joyce's Task Force Libeccio report contains in one of its appendices reports from CTV reporter Murray Brewster and *National Post* reporter Tom Blackwell about Canadian pilots going out of their way to ensure there was no collateral damage in their missions and that they adhered to UNSCR 1973's emphasis on RTP civilians and other valuable contributions.[144]

Joyce's report also gives other examples of such professionalism and adherence to the LOAC that demonstrate the legitimacy of the RCAF targeting efforts. For instance, the report records that RCAF personnel were cautious due to challenges related to the intelligence upon which targeting information was based:

> For most of the operation, Canada was reliant on other nations' intelligence product for the development of target packages to be prosecuted by the CF188. Aside from national security requirements and a lack of connectivity to classified information networks, releasability issues were encountered when trying to obtain details from other nations on targets derived from sensitive sources. This impaired the ability of the ACE [Air Coordination Element], who was also the national Red Card Holder (RCH), to make sound and accurate assessments on whether nominated targets complied with national interests, ROE, and intents for the conduct of the mission. As a result, the ACE had to refuse a number of targets due to the lack of information.[145]

Even though Joyce observes that this practice may have been "overcautious" and not necessarily warranted, it was a better-safe-than-sorry situation that showed the professionalism of the RCAF targeting officials and the lengths they went to ensure the legality and legitimacy of Canadian targeting.[146] In addition, Milewski notes in his report on Op IMPACT that such were the concerns over collateral damage and the lengths the RCAF took to ensure the legitimacy of their targeting, that "most of Canada's sorties in Iraq returned without dropping any [bombs]."[147] It is these types of stories that should dominate the news cycle and become etched in the minds of Canadians, not the extremely rare or questionably negative ones that our adversaries seem to be able to communicate to influence our home-front hearts and minds.

Another way the RCAF can improve strategic communications is to ensure greater transparency as well as proactive and timely release of relevant targeting documentation and information. Granted, greater transparency will need to be balanced against the requirement to maintain a classified designation to protect the mission (and its personnel), lest adversaries be able to use this information for their own tactical and operational

purposes.[148] Nonetheless, being as forthcoming and transparent as possible through the quick release of relevant targeting information to the Canadian public can be a huge weapon in the narrative war and should be an essential aspect of any RCAF targeting expertise. This is best captured by Mark Jacobson:

> Transparency on the impacts of kinetic operations should be viewed as an absolute imperative for success at both the operational and strategic level. After all, the failure to convince the host nation, NATO, and international audiences that reducing civilian casualties is a priority, can lead to a lack of sustained political support and thus potential mission failure.[149]

He recommends establishing a specialized unit at NATO headquarters to "address the political and strategic aspects of civilian casualty mitigation" and similar units that can be deployed in NATO CAOCs. An RCAF targeting expertise should address these very issues, and personnel trained for this purpose should be assigned to any such NATO units and be able to deploy and plug into a NATO CAOC.[150]

In addition to transparency, speed in the release of relevant targeting information will also help the RCAF in the narrative war.[151] Milewski advocates that a more timely release would have helped the RCAF (and DND writ large) because "the document shows Canada's air force flying loops to avoid mistakes" and how the RCAF, by going to great lengths in the targeting cycle to ensure legitimate targeting, "seems to bend over backward to protect non-combatants—even if they're ISIS sympathizers."[152] The immediate communication of true information of legal and legitimate Western air power and targeting to both the host-nation and home-front populations could potentially be very useful to counter "any charges of civilian casualties or collateral damage allegedly caused by NATO."[153]

There are additional means that an RCAF targeting expertise should employ as weapons in the narrative war. One is to have a social-media policy that is not only proactive in terms of communicating positive aspects about RCAF targeting but also balances this with greater awareness and discretion by personnel of disseminating information that could be controversial or could assist an adversary's narrative.[154] Another is to give greater access to vetted journalists to observe and report on targeting operations. Part of this vetting should also include special training for journalists on the complexities of modern military operations to ensure more objective reporting. Finally, extensive training in strategic communications should be a mandatory requirement for all RCAF targeting experts.[155]

In summary, an RCAF expertise in targeting should include an understanding of the cognitive-social aspects of air power and targeting as they relate to strategic messaging because it will assist greatly with winning the narrative war. Such RCAF "cognitive dominance" focused on our own centre of gravity will help the government, public and media better appreciate the RCAF's legal, legitimate and humane prosecution of air power and targeting and will contribute to greater national moral courage to conduct

air campaigns.[156] This, in turn, to borrow a phrase from Col Olsen, can systemically empower the RCAF to conduct expeditionary air operations. Although it is asking too much for an RCAF targeting specialty to solve all the social-cognitive challenges related to strategic messaging, at the very least, having an understanding of and appreciation for these challenges will aid the RCAF not only in future targeting endeavours but also in its overall application of expeditionary air power in support of both Canadian interests and coalition efforts.

NOTES

1. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, A-12/1.

2. Canada, DND, "The Chief of the Defence Staff Announces Canadian Armed Forces General and Flag Officer Senior Appointments, Promotions, and Retirements," January 19, 2016, accessed May 3, 2018, https://www.canada.ca/en/department-national-defence/news/2016/01/the-chief-of-the-defence-staff-announces-canadian-armed-forces-general-and-flag-officer-senior-appointments-promotions-and-retirements.html.

3. LCol Jeff Lebouthillier, "Joint Targeting Overview" (webinar transcript, CFAWC, May 19, 2016), accessed May 3, 2018, http://w08-ttn-vmweb01/cfawc/en/awe/webinars/joint-targeting-overview.asp. General Vance has also used targeting terminology in his messaging on Operation HONOUR: "We will use the intelligence we've gathered on Operation HONOUR to target our efforts where they're most needed. In particular, we now know more about where the perpetrators of harmful sexual behaviour are often found within our ranks. I have targeting information now. And I will use it to target the minority of our members who continue to disobey my orders by harming their comrades." General J. H. Vance, "Message from the CDS on the Statistics Canada Survey into Sexual Misconduct in the Canadian Armed Forces," Canada, DND, November 28, 2016, accessed May 3, 2018, http://www.forces.gc.ca/en/news/article.page?doc=message-from-the-cds-on-the-statistics-canada-survey-into-sexual-misconduct-in-the-canadian-armed-forces/ivxn5bvm.

4. "Royal Canadian Air Force and NATO," 17.

5. "Royal Canadian Air Force and NATO," 17.

6. Lebouthillier, "Joint Targeting Overview."

7. Kainikara, "Future Relevance of Smaller Air Forces," 7; Captain John R. Glock, "The Evolution of Air Force Targeting," *Air & Space Power Journal* 26, no. 6 (November–December 2012): 169, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1159752/volume-26-issue-6-nov-dec-2012/; Anrig, "Allied Air Power over Libya," 278; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 29; and Kainikara, *Seven Perennial Challenges*, 60. One USAF officer even goes so far as to remark that "from the alpha to the omega, targeting has been the essence of air power." Glock, "Evolution of Air Force Targeting," 147. However, as with air power in general, an air force should also be wary of over-promising targeting capabilities and the effects they can achieve, lest it develop a reputation of failing to deliver on promises—an unfortunate stigma that air power has been saddled with since the articulation of the early air power theories of the inter-war period. See, for instance, Kainikara, *Seven Perennial Challenges*, 64.

8. "Royal Canadian Air Force and NATO," 17.

9. Glock, "Evolution of Air Force Targeting," 163, 168.

10. Penney, "Canadian Armed Forces' Effectiveness," 11; and Lebouthillier "Joint Targeting Overview." Recent CAF targeting initiatives have included establishing a joint targeting committee in 2012; publishing CAF operational-level targeting doctrine, CFJP 3-9, *Targeting*; establishing and sending personnel on targeting courses in Kingston and Shirley's Bay; sending personnel to attend US and NATO targeting courses; and producing a series of webinars on targeting. Lebouthillier, "Joint Targeting Overview."

11. Lebouthillier, "Joint Targeting Overview."

12. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, (Ottawa: Canadian Forces Warfare Centre, 12 December 2014), 1-1, GL-7, accessed May 3, 2018, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560. Lebouthillier elaborates on this definition of targeting, describing it as: "the process of analysing, selecting, and prioritizing legitimate targets, then matching the appropriate lethal or non-lethal response to them, while taking into account the operational requirements of, and capabilities available to, a fighting force. Targeting essentially links desired effects to specific actions which support a higher-level comprehensive plan." LCol Jeff Lebouthillier, "Darts 001 / Targeting 101," *InForm*, no. 2 (December 2014): 1, accessed May 3, 2018, http://w08-ttn-vmweb01/CFAWC/en/inform/archive.asp.

13. Lebouthillier, "Joint Targeting Overview."

14. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 1-2.

15. Lebouthillier, "Darts 001 / Targeting 101."

16. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*; and Lebouthillier, "Joint Targeting Overview." For a good summary of these procedures and processes, see Penney, "Canadian Armed Forces' Effectiveness," 2–7; Lebouthillier, "Joint Targeting Overview"; and Lebouthillier, "Darts 001 / Targeting 101."

17. See Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, Chapter 2, Legal Considerations.

18. Lebouthillier, "Darts 001 / Targeting 101."

19. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, Chapter 2, Legal Considerations.

20. Lebouthillier, "Joint Targeting Overview"; Lebouthillier, "Darts 001 / Targeting 101"; and Kainikara, *Seven Perennial Challenges*, 45–46.

21. See Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-9–2-10.

22. Terry Milewski, "Inside Canada's Bombing Bureaucracy," CBC News, March 5, 2016, accessed May 3, 2018, http://www.cbc.ca/news/politics/cf18-bombing-forms-milewski-1.3476675.

23. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, M-3/3.

24. LCol Penney observes that during Op MOBILE disagreements between the red card holder (i.e., TEA) and LEGAD were few, but in those cases, the former used his best judgement and exercised his authority to make the operational decision regarding the prosecution of the target. He also notes that this arrangement was much more restrictive for Op IMPACT, which resulted "in a policy of decision by committee." Penney, "Canadian Armed Forces' Effectiveness," 22.

25. Although CAF targeting doctrine utilizes the term "non-munitions," this study uses "non-kinetic," as it is a term that is more familiar in the literature. See, for instance, Paul A. L. Ducheine, "Non-kinetic Capabilities Complementing the Kinetic Prevalence to Targeting," in *Targeting: The Challenges of Modern Warfare*, ed. Paul A. L. Ducheine, Michael N. Schmitt, and Frans P. B. Osinga (The Hague: Asser Press, 2016), 201–30.

26. On non-lethal weapons see Tracy J. Tafolla, David J. Trachtenberg, and John A. Aho, "From Niche to Necessity: Integrating Nonlethal Weapons into Essential Enabling Capabilities," *Joint Force Quarterly*, no. 66 (3rd Quarter 2012): 71–79, accessed May 3, 2018, http://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-66.aspx.

27. In defining the RCAF's mission, *Air Force Vectors* in particular "recognizes the growing importance of non-kinetic air power capabilities." In describing the attributes of RCAF air power, *Air Force Vectors* states that "Canadian air power must be balanced with non-kinetic and lethal weapons." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 25, 28.

28. Ducheine, "Non-kinetic Capabilities Complementing," 204, 212–24; and Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 5-1.

29. Ducheine, "Non-kinetic Capabilities Complementing," 207, 214; and Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-14, 4-4.

30. Ducheine, "Non-kinetic Capabilities Complementing," 202–3.

31. Tafolla, Trachtenberg, and Aho, "From Niche to Necessity," 72.

32. Penney, "Canadian Armed Forces' Effectiveness," 18; Glock, "Evolution of Air Force Targeting," 147; 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 6, A-12/13; Mayne, "Canadian Experience," 263; Canada, DND, *FAOC*, 15 August 2016, 9; Kainikara, *Seven Perennial Challenges*, 21, 60; and Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 4-18–4-19, 6-2.

33. Quoted in Glock, "Evolution of Air Force Targeting," 146.

34. Glock, "Evolution of Air Force Targeting," 146; and Kainikara, *Seven Perennial Challenges*, 12.

35. Canada, DND, "Low Collateral Damage Weapon," in *Defence Acquisition Guide 2016*, accessed May 3, 2018, http://www.forces.gc.ca/en/business-defence-acquisition-guide-2016/aerospace-systems-925.page; Jeff Davis, "Canadian Air Force Looking for Bombs with 'Less Bang,'" *National Post*, March 29, 2012, accessed May 3, 2018, http://news.nationalpost.com/news/canada/canadian-air-force-looking-for-bombs-with-less-bang; Hood, "Panel #1 Domestic, Continental and Deployed Operations," 12; Woodward and Morrison, "Responsibility to Protect," 24; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 6, 3, A-6/13. Quote from "Low Collateral Damage Weapon."

36. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 4-14; and Brown, "To Bomb or Not to Bomb?," 81–82. Brown points out, correctly, that the main focus of BDA should be on the various effects, "not just the performance of weapons." Brown, "To Bomb or Not to Bomb?," 81.

37. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 4-8; and Lebouthillier, "Joint Targeting Overview."

38. Barnes, "Mission Command and the RCAF."

39. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5–6; and LCol Jared Penney, "Command Imperative to Targeting: Canadian Armed Forces' Effectiveness in Targeting with Air Power during Operations MOBILE and IMPACT," *Royal Canadian Air Force Journal* 5, no. 4 (Fall 2016): 46–47, 53–54, 55, accessed May 3, 2018, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2016-vol5-iss4-fall.page. Quote from Penney, "Canadian Armed Forces' Effectiveness," 55.

40. Penney, "Canadian Armed Forces' Effectiveness," 21. Though Bouchard was specifically referencing the military strategic level in Ottawa (i.e., CJOC), the idea of interference from home in the conduct of

overseas operations is reflected in Kainikara's remarks that "political interference, however benign, in the actual conduct of an air campaign is the first step towards failure and eventual defeat." Kainikara, *Seven Perennial Challenges*, 60.

41. The Op IMPACT experience with targeting is illustrative of such friction: "The CJOC team's unfamiliarity with the current ground situation, complicated and changing targeting directives, air weapons effects, and CDE methodology often led to long discussions with the TEA explaining in layman terms complex factors. It would be disingenuous to criticise the intentions or professionalism of the CJOC staff, however they did not have access to all of the expertise, resources and information nascent within the CAOC." Penney, "Canadian Armed Forces' Effectiveness," 21. See also the section on "End State and Commander's Guidance" in Lebouthillier, "Joint Targeting Overview."

42. Penney, "Canadian Armed Forces' Effectiveness," 1; Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 4-14; and Lebouthillier, "Darts 001 / Targeting 101." For details about the dynamic targeting cycle, see Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*; and Lebouthillier, "Joint Targeting Overview."

43. Anrig, "Allied Air Power over Libya," 269; and Mayne, "Canadian Experience," 255.

44. Squadron Leader Tim Harrison, "Time Sensitive Targeting: Time for a Change?," *Joint Air Power Competence Centre Journal*, no. 2 (2005): 15, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-2/.

45. Anrig, "Allied Air Power over Libya," 264.

46. This resulted in many pilots having to wait until the situation became one of self-defence before prosecuting the target, which is of course very risky to the pilot. Penney, "Canadian Armed Forces' Effectiveness," 21, 27.

47. This focus on dynamic targets is especially necessary in modern warfare since prosecuting dynamic tactical targets such as armed individuals and "tank plinking" has become the norm—in comparison to the high-value strategic deliberate targets dictated by air power theorists such as Warden. Goette, "Command and Control Implications," 77; Mayne, "Canadian Experience," 255; and discussions in author's DS 501 Modern Joint Air Campaigns class, 2014–present.

48. Milewski, "Inside Canada's Bombing Bureaucracy."

49. Lebouthillier, "Joint Targeting Overview." USAF Maj Brown echoes these sentiments about the intricate and time-consuming targeting process, remarking that "despite the ability of tactical-level personnel to conduct targeting functions reliably with current technologies in many situations, the target-development process typically remains time-consuming, inflexible, and centralized at the operational level." Brown, "To Bomb or Not to Bomb?," 80.

50. Milewski, "Inside Canada's Bombing Bureaucracy."

51. Lebouthillier, "Joint Targeting Overview." Lebouthillier lists the following as typical items found on an NSL: "religious, cultural, historical institutions and their associated structures; medical facilities (both civilian and military); public education facilities including non-military schools, colleges, universities, and institutes; civilian refugee camps and concentrations; and dams or dykes whose engagement may result in the flooding of civilian areas." Lebouthillier, "Joint Targeting Overview." Also see Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 4-8, GL-5.

52. Wells, "One Swallow Maketh Not," 70.

53. Wells, "One Swallow Maketh Not," 70; and Penney, "Canadian Armed Forces' Effectiveness," 10.

54. Goette, "Command and Control Implications," 71–72.

55. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-15; Penney, "Canadian Armed Forces' Effectiveness," 7, 19–20; Lebouthillier, "Darts 001 / Targeting 101"; and Goette, "Command and Control Implications," 71–72. In the case of Op MOBILE, "the CAF TEA team" located in the coalition CAOC "comprised of a TEA supported by a LEGAD and an Intelligence officer." Penney, "Canadian Armed Forces' Effectiveness," 19.

56. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-14–2-16; Phinney, "Reflections on Operation Unified Protector," 87 and 92, notes 28 and 29; Goette, "Command and Control Implications," 72; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5.

57. Goette, "Command and Control Implications," 68, 71–72; and Barnes, "Command or Control?"

58. Anrig, "Allied Air Power over Libya," 260; and Penney, "Canadian Armed Forces' Effectiveness," 14–15.

59. Wells, "One Swallow Maketh Not," 70. Wells humourously adds: "one starts to envy the decentralised command structure of Al Qaeda!"

60. Phinney, "Reflections on Operation Unified Protector," 89.

61. Woodward and Morrison, "Responsibility to Protect," 23.

62. Quoted in Penney, "Command Imperative to Targeting," 53.

63. Phinney, "Reflections on Operation Unified Protector," 90. Phinney notes further the great efforts of the combined force air component commander (CFACC) and CFACC director to turn a national red card holder "into a 'Green Card' relationship [by] using inclusion, transparency, and regular SNR [senior national representatives] / CFAC [combined force air component] meetings. The national level of responsibility held by these officers, often colonels and lieutenant colonels, was substantial and their dedication and conduct is noteworthy." Phinney, "Reflections on Operation Unified Protector," 92, note 28.

64. Lebouthillier, "Darts 001 / Targeting 101."

65. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-15; and Phinney, "Reflections on Operation Unified Protector," 87. For a Canadian example, see Penney, "Canadian Armed Forces' Effectiveness," 12–13.

66. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-15.

67. Mayne, "Canadian Experience," 263.

68. Høiback, "Too Good for Comfort?," 48.

69. Canada, DND, *FAOC*, 15; and Canada, DND, A-FD-005-001/AF-003, *Future Security Environment 2013–2040*, 92–93.

70. Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 11, 25.

71. For an excellent discussion of modern air forces' challenge with collateral damage, see Kainikara, *Seven Perennial Challenges*, 57–62. "Dealing with Collateral Damage" is Kainikara's seventh challenge.

72. Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, GL-1.

73. Kainikara, *Seven Perennial Challenges*, 57.

74. Lebouthillier, "Darts 001 / Targeting 101."

75. Kainikara, *Seven Perennial Challenges*, 60–61. Since the operational level of warfare/conflict links tactical actions to strategic goals and effects, an RCAF targeting specialty will, therefore, require operational-level thinking and practice of the operational art. Canada, DND, B-GJ-005-300/FP-001, CFJP 3.0, *Operations*, Chapter 1, 0107–0110, 1-2; and Howard G. Coombs, "Perspectives on Operational Thought," in *The Operational Art: Canadian Perspectives – Context and Concepts*, ed. Allan English et al. (Kingston: Canadian Defence Academy Press, 2005), 76–77.

76. Kainikara, *Seven Perennial Challenges*, 60.

77. Kainikara, *Seven Perennial Challenges*, 60.

78. Goette, "Command and Control Implications," 72–73; and Kainikara, *Seven Perennial Challenges*, 56, 59.

79. The term "casualty" is frequently misunderstood in today's society. "Casualties" have historically included dead, wounded and missing, but in modern narratives, the latter two are largely overlooked, as people tend to place greater emphasis on deaths. Hugh Smith, "What Costs Will Democracies Bear? A Review of Popular Theories of Casualty Aversion," *Armed Forces & Society* 31, no. 4 (Summer 2005): 490, accessed May 3, 2018, http://journals.sagepub.com/toc/afsa/31/4.

80. United Nations Security Council, Resolution 1973; Tafolla, Trachtenberg, and Aho, "From Niche to Necessity," 72; Penney, "Canadian Armed Forces' Effectiveness," 26; and 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5.

81. Quoted in Tafolla, Trachtenberg, and Aho, "From Niche to Necessity," 74.

82. Kainikara, *Seven Perennial Challenges*, 1.

83. Kainikara, *Seven Perennial Challenges*, 52.

84. Kainikara, *Seven Perennial Challenges*, 1.

85. This paragraph references Kainikara, *Seven Perennial Challenges*, 1, 16, 51–52, 55–56.

86. For an interesting examination of the phenomenon of casualty aversion, see Smith, "What Costs Will Democracies Bear?"

87. Osinga, "AQ, ISIS, Postmodern Warfare"; Christopher Coker, "Targeting in Context," in ed. Ducheine, Schmitt, and Osinga, *Targeting*, 15–16; and M. L. R. Smith and Sophie Roberts, "War in the Gray: Exploring the Concept of Dirty War," *Studies in Conflict & Terrorism* 31, no. 5 (May 2008): 381, accessed May 3, 2018, https://www.tandfonline.com/toc/uter20/31/5?nav=tocList. Quotes from Smith and Roberts, "War in the Gray," 381.

88. Lebouthillier, "Joint Targeting Overview." See also LCol Jim Bates, "Air's Contribution to Information Operations," *Joint Air Power Competence Centre Journal*, no. 6 (2007): 22–25, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-6/.

89. Lebouthillier, "Joint Targeting Overview."

90. It is also consistent with the integrated vector in *Air Force Vectors* under the heading "Connecting with Canadians," which states that "the RCAF will engage Canadians from the national to the local level, ensuring that they understand the Air Force's roles and contributions." Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 38.

91. Kainikara, *Seven Perennial Challenges*, 8.

92. The other dimensions of strategy are operational, logistical and technological. Sir Michael Howard, "The Forgotten Dimensions of Strategy," in *The Causes of Wars and Other Essays*, ed. Michael Howard, 2nd ed. (Cambridge, MA: Harvard University Press, 1983), 105, as referenced in Anrig, "Allied Air Power over Libya," 276. Anrig, in particular, comments on the conflict in Afghanistan, noting that while the war has been militarily successful, "the conflict remains dominated by the social dimension, making it nearly impossible for the West to effect decisive results at the strategic level, even after 10 years of continuous deployments." Anrig, "Allied Air Power over Libya," 277.

93. Anrig, "Allied Air Power over Libya," 280.

94. Kainikara, *Seven Perennial Challenges*, 12; and Paul A. L. Ducheine et al., "Introduction," in ed. Ducheine et al., *Targeting*, 16.

95. Quoted in Sabin, "Air Power's Second Century," 56.

96. Kainikara notes that "national morale is a fragile entity and can be very easily fractured" and states that "by targeting the soft centre of gravity of public support to the war, the adversary manipulates the results of even individual tactical actions to create strategic effects." Kainikara, *Seven Perennial Challenges*, 56, 53.

97. Brown, "To Bomb or Not to Bomb?," 76.

98. This paragraph references Phinney, "Reflections on Operation Unified Protector," 90; Canada, DND, *FAOC*, 9; Tafolla, Trachtenberg, and Aho, "From Niche to Necessity," 74; Høiback, "Too Good for Comfort?," 47; Canada, DND, A-GA-007-000/AF-008, *Air Force Vectors*, 11; Kainikara, *Seven Perennial Challenges*, 9–10, 46, 49, 52–53; Maj Önder Şahan, "Hybrid Warfare: Air Power and the Narrative," *Joint Air Power Competence Centre Journal*, no. 16 (Autumn/Winter 2012): 64–65, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-16/; and Captain Joseph O. Chapa, "Remotely Piloted Aircraft and War in the Public Relations Domain," *Air & Space Power Journal* 28, no. 5 (September–October 2014): 29–30, accessed May 3, 2018, http://www.airuniversity.af.mil/ASPJ/Display/Article/1154073/volume-28-issue-5-sep-oct-2014/. Jim Corum makes the astute observation that "air power is NATO's major asymmetric advantage," but for this reason, it is also the enemy's "primary target for disinformation campaigns designed to undermine support for NATO operations." James S. Corum, "NATO Airpower and the Strategic Communications Challenge: About the JAPCC's Airpower and Disinformation Study," *Joint Air Power Competence Centre Journal*, no. 21 (Autumn/Winter 2015): 42, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-21/.

99. Corum, "NATO Airpower and the Strategic," 42, 44; Tafolla, Trachtenberg, and Aho, "From Niche to Necessity," 72, 74; and Brown, "To Bomb or Not to Bomb?," 78. Quote from Corum, "NATO Airpower and the Strategic," 44. Corum references the following example from Afghanistan: "Although the International Security Assistance Force (ISAF) operated under careful rules of engagement and paid compensation to families of civilians killed or wounded in the course of military operations, a constant Taliban disinformation campaign was quite successful in creating public discontent against ISAF forces. Afghan President Karzai's routine condemnations of ISAF actions did little to help this situation. By 2008, it was clear to ISAF's leaders that the Taliban was exploiting air power issues very effectively. A poll of Afghanis in 2009 showed that 77% of Afghanis believed that air operations caused excessive casualties. As to the blame, 41% of Afghanis thought poor NATO targeting was the main cause of civilian casualties and only 28% of Afghanis put most of the blame on the Taliban for operating too close to civilians." The consequence of

this situation was that ISAF Commander General McKiernan "issued rules that limited the use of air power and tightened the rules of engagement" which both "involved greater risk to NATO forces" and had a direct negative effect on the ability to conduct successful targeting. Corum, "NATO Airpower and the Strategic," 45–46.

100. Şahan, "Hybrid Warfare," 66. Public and especially government will to support military campaigns is arguably consistent with what Australian air power academic Kainikara terms "moral courage at the grand strategic level of governance." Such moral courage is essential, he argues for "success of any national security endeavour" and "to the success of military command at all levels." It requires "careful nurturing over time," and "at the highest levels of national command this can only be achieved when there is transparent and demonstrated mutual confidence between the civilian and military leadership." Kainikara, "Future Relevance of Smaller Air Forces," 9.

101. On the revolutionary effect of PGMs, see Michael Russell Rip and James M. Hasik, *The Precision Revolution: GPS and the Future of Aerial Warfare* (Annapolis, MD: Naval Institute Press, 2002).

102. Coker, "Targeting in Context," 17; Gary Schaub, "The Future of Airpower" (presentation, "The Transformation of European Airpower: Lessons for the Royal Danish Air Force" conference, Centre for Military Studies, The Kastellet, Copenhagen, Denmark, November 12–13, 2014); Kainikara, *Seven Perennial Challenges*, 12; Lebouthillier, "Darts 001 / Targeting 101"; and Sean Kimmons, "General: Airpower Key to ISIL Fight; Strikes to Continue," USAF News Service, February 18, 2016, accessed May 3, 2018, http://www.af.mil/News/Article-Display/Article/658205/general-airpower-key-to-isil-fight-strikes-to-continue/. As LGen Hood remarked to the House of Commons Standing Committee on National Defence, "the precise demands, certainly of air power, have evolved immensely." Canada, House of Commons, Standing Committee on National Defence, "Evidence," 6.

103. Osinga, "AQ, ISIS, Postmodern Warfare," 2.

104. Glock, "Evolution of Air Force Targeting," 169.

105. Kainikara, "Future Relevance of Smaller Air Forces," 11; Smith, "What Costs Will Democracies Bear?," 497–98; Goette, "Command and Control Implications," 72; Kainikara, *Seven Perennial Challenges*, 47–48, 53; and Corum, "NATO Airpower and the Strategic," 43.

106. Corum, "NATO Airpower and the Strategic," 43.

107. This paragraph references Kainikara, *Seven Perennial Challenges*, 53, 58–59. Quote from Corum, "NATO Airpower and the Strategic," 43.

108. Corum, "NATO Airpower and the Strategic," 44; and Kainikara, *Seven Perennial Challenges*, 47, 52–53.

109. Corum, "NATO Airpower and the Strategic," 46.

110. Corum, "NATO Airpower and the Strategic," 46.

111. Nigel Jones and Paul Baines, "Losing Control? Social Media and Military Influence," *The RUSI Journal* 158, no. 1 (February/March 2013): 72–78; and "Royal Canadian Air Force and NATO," 17.

112. Kainikara, *Seven Perennial Challenges*, 54.

113. Corum, "NATO Airpower and the Strategic," 44.

114. Corum, "NATO Airpower and the Strategic," 46.

115. Milewski, "Inside Canada's Bombing Bureaucracy."

116. Kainikara, *Seven Perennial Challenges*, 50, 60; Penney, "Canadian Armed Forces' Effectiveness," 26; Brown, "To Bomb or Not to Bomb?," 80; Coker, "Targeting in Context," 18; Goette, "Command and Control Implications," 72; Şahan, "Hybrid Warfare," 65; and Canada, DND, B-GJ-005-309/FP-001, CFJP 3-9, *Targeting*, 2-7.

117. Kainikara, *Seven Perennial Challenges*, 48. Kainikara adds: "The challenge for air force commanders and professional masters of air power is to unravel these knots and to be able to apply air power in a legal and, more importantly, an acceptable manner in pursuing national security interests and imperatives—a tall order, under any circumstance." Kainikara, "Future Relevance of Smaller Air Forces," 50.

118. For instance, one Washington Institute report on Operation INHERENT RESOLVE notes that targeting "restraint has likely decreased the damage inflicted on ISIS, but it has also paid huge dividends in assembling a broad coalition." Scott A. Vickery, "Operation Inherent Resolve: An Interim Assessment," The Washington Institute, January 13, 2015, accessed May 3, 2018, http://www.washingtoninstitute.org/policy-analysis/view/operation-inherent-resolve-an-interim-assessment, quoted in Penney, "Canadian Armed Forces' Effectiveness," 26.

119. Kainikara, *Seven Perennial Challenges*, 5, 8.

120. Høiback, "Too Good for Comfort?," 47. He adds: "**Do Not Expect Miracles**. … Do not expect predictable effects from the use of arms. The ever present friction of war makes, as we know, the simplest things difficult. Instead of concern towards Air Power's inability to produce political miracles in remote corners of the world, we should be pleased of our ability to avoid major errors and contribute in making peoples' lives better." [emphasis in original] Høiback, "Too Good for Comfort?," 48.

121. Høiback, "Too Good for Comfort?," 47; and Penney, "Canadian Armed Forces' Effectiveness," 26–27.

122. Kainikara, *Seven Perennial Challenges*, 61.

123. Høiback, "Too Good for Comfort?," 48.

124. Kainikara, *Seven Perennial Challenges*, 59.

125. Kainikara, *Seven Perennial Challenges*, 61.

126. Kainikara notes that "the application of lethal force from the air is responsible for about 15 per cent of the total collateral damage." Kainikara, *Seven Perennial Challenges*, 59.

127. Kainikara captures this requirement nicely: "Collateral damage and its political fallout will not ever become an issue of the past, irrespective of the legality and sophistication of the application of lethal force. Air commanders have to become experts at mitigating the repercussions of collateral damage—through all levels of the national security debate—to ensure that battlefield victories do not become unwitting strategic defeats." Kainikara, *Seven Perennial Challenges*, 61–62.

128. Høiback, "Too Good for Comfort?," 45.

129. Kainikara, *Seven Perennial Challenges*, 6; and Corum, "NATO Airpower and the Strategic," 42.

130. Sabin, "Air Power's Second Century," 59. This stigma is even more pronounced with RPAs, which air power academic Mark Jacobson notes have been sullied due to "misplaced modern chivalry." Dr. Mark R. Jacobson, "The Advent of the 'Armed Drones': Imperatives for the NATO Alliance," *Joint Air Power Competence Centre Journal*, no. 18 (Autumn/Winter 2013): 54, accessed May 3, 2018, https://www.japcc.org/portfolio/journal-18/.

131. Corum, "NATO Airpower and the Strategic," 40.

132. Corum, "NATO Airpower and the Strategic," 44.

133. Corum, "NATO Airpower and the Strategic," 40.

134. This paragraph references Kainikara, *Seven Perennial Challenges*, 6.

135. Corum, "NATO Airpower and the Strategic," 43.

136. Corum, "NATO Airpower and the Strategic," 43.

137. Corum, "NATO Airpower and the Strategic," 43.

138. Milewski, "Inside Canada's Bombing Bureaucracy."

139. Canada, DND, *FAOC*, 1. Quote from Kainikara, "Future Relevance of Smaller Air Forces," 7. Kainikara notes further that discrimination, proportionality and accuracy are the "benchmark … [on which] the capability and relevance of air power, and by extension air forces, to national security will be judged. The challenges to air power are many, but they have to be overcome to create confidence and reliability in its capabilities, without which its employment will become questionable. This is a paramount political and strategic imperative that smaller air forces can ill-afford to ignore." Kainikara, "Future Relevance of Smaller Air Forces," 10.

140. Corum, "NATO Airpower and the Strategic," 47.

141. Corum, "NATO Airpower and the Strategic," 47.

142. Corum, "NATO Airpower and the Strategic," 47.

143. LCol D. E. Molstad, "CF-18s in Combat from Iraq to Libya: The Strategic Dividend of Fighters" (Master of Defence Studies, CFC, 2011), 73, accessed May 3, 2018, https://www.cfc.forces.gc.ca/259/290/297/286/molstad.pdf.

144. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, K1-12/25–K1-24/25.

145. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5.

146. 1630-1 (Comd TF LIB), End of Tour Report – Task Force Libeccio, 5.

147. Milewski, "Inside Canada's Bombing Bureaucracy."

148. Kainikara, *Seven Perennial Challenges*, 54.

149. Jacobson, "Advent of the 'Armed Drones,'" 56.

150. Jacobson, "Advent of the 'Armed Drones,'" 56.

151. Corum, "NATO Airpower and the Strategic," 46.

152. Milewski, "Inside Canada's Bombing Bureaucracy." He adds: "apparently, you can spread ISIS propaganda and help to conceal ISIS movements, but as long as you're not actually fighting, you're not a legitimate target." Milewski, "Inside Canada's Bombing Bureaucracy."

153. Corum, "NATO Airpower and the Strategic," 48.

154. Jones and Baines, "Losing Control?," 77.

155. Corum, "NATO Airpower and the Strategic," 47–48.

156. Kainikara, *Seven Perennial Challenges*, 7; and Kainikara, "Future Relevance of Smaller Air Forces," 9, 13.

11
Conclusion

This study has analysed potential expeditionary niches for the RCAF to pursue while allied with its peers and maintaining the first-principle responsibility to protect Canada. Using Australian air power academic Kainikara's air-force conceptual categorization, this study has outlined both the benefits and drawbacks of converting the RCAF's present balanced smaller-air-force construct to a niche air force. It has done so fully appreciating that fiscal and personnel pressures mean that the RCAF will not have the capacity to adopt all of the possible niches outlined but also recognizing that the RCAF may not, in the end, wish to adopt a niche approach. Even so, it is hoped that in describing possible niches this study provides important insights into ways that the RCAF can enhance existing capabilities as well as improve and augment its current construct.

Air power is increasingly the first option for a government to utilize in reaction to a crisis situation overseas. Since the RCAF embodies the indivisibility of air power, this means that it is an essential and primary tool of the Canadian government for CAF expeditionary operations. The realities of the 21st century security and defence environment mean that the RCAF, along with its joint partners, will have to be capable of operating across the entire spectrum of conflict and with JIMP partners. Moreover, as a smaller air force of a nation that advocates multilateralism, the RCAF will be required to operate with other actors, either in a formal alliance such as NATO or in a broad-based coalition normally under a UN mandate. Operating with other nations means that interoperability is an essential RCAF consideration. This is especially the case with Canada's closest ally, the US, as the RCAF will be required to not only build on its existing strong relationship with USAF but also improve interoperability with the other American services. However, it is important to take into consideration the fact that the US, as it enters into a period of greater isolationism, desires its allies to take on a greater role in coalition expeditionary endeavours. Therefore, the RCAF must be cognizant of ensuring interoperability with other allies and partners in overseas operations which feature decreased American involvement.

The demands on air power in today's security and defence environment could potentially result in the RCAF being in a familiar situation of operating at a high tempo but with fewer resources. The potential niches outlined in this study, therefore, address the requirement

for the RCAF to recognize such limitations by being more efficient and effective with its funding and resources to justify its expeditionary capability requirements.

This study assumes that the three classical Canadian military roles of the defence of Canada, the defence of North America in conjunction with the US as well as contribution to global peace and security will endure. Although the first two military roles will be the main priorities, this study also observes that Canada's geography and the RCAF's subsequent unique air power responsibilities mean that its domestic and expeditionary roles are complementary. Moreover, the requirement to operate on the entire spectrum of conflict, including PSOs, will result in soft-power, non-kinetic missions but will also necessitate maintaining RCAF hard-power capabilities. In addition, as the RCAF's *FAOC* has recognized, the RCAF's current conventional force construct is sufficiently flexible and agile to ensure that Canada's air force is capable of conducting operations on this spectrum ranging from peace / peacetime military engagement to major combat / war. Although the latter has been less likely, for several years, this study has shown that rising A2/AD threats from regional actors (such as Russia, China and Iran) may require the RCAF to operate in a contested and degraded environment. This, in turn, will require that the RCAF enhances its capabilities if it is to remain interoperable with its closest allies, especially the US. Understanding the need to balance the realities and challenges of the modern security and defence environment with Canadian government defence policy and guidance, this study has offered potential RCAF expeditionary niches:

- **AAR** is reflective of the RCAF's reach vector and is a proven force enabler and multiplier in domestic and coalition operations. By providing Canadian AAR assets during Ops MOBILE and IMPACT, the RCAF has, arguably, been able to punch above its weight. Therefore, further investment in AAR is a way for the RCAF to provide a vital sustainment capability that permits essential reach and strategic flexibility for itself and for allies in coalition endeavours.

- The RCAF has a rich history of **training** allied air personnel. An essential aspect of air power, air training is a force-generation role in which the RCAF excels. This is a key capability that the RCAF can offer to assist its allies and coalition partners.

- Along the same lines, an **air-advisory** niche could be an essential way for the RCAF to contribute to coalition force generation, building and training of overseas coalition forces. Modest RCAF capabilities preclude an RCAF air-advisory effort along the same lines of USAF. Nonetheless, selective application of Canadian air power expertise (comprising of a variety of air power roles and responsibilities due to the RCAF's exercise of the indivisibility of air power) in an air-advisory role may allow the RCAF to make an important non-kinetic contribution to an overall Canadian government state-building effort in failed or failing states and, thus, realize Col Olsen's concept of systemic empowerment.

- Contributing well-trained and professional **personnel** could be an important niche that the RCAF could provide to coalition endeavours, especially if the government is contributing specific platforms. Again, the RCAF has a rich history of providing high-quality personnel and staff to fill key roles in coalitions. However, it should not rest on its laurels: the RCAF will need to continuously strive to improve the competencies of its personnel through professional air power mastery initiatives centred on a holistic comprehension of air power, operating in a coalition construct (including in CAOCs) and Canada's unique air power capabilities.

- For similar reasons, expertise in **jointness** is another potential niche the RCAF can offer to coalition endeavours. Since working with joint partners will be essential in any RCAF expeditionary operation, having airminded Canadian air-force personnel will permit the understanding of problems and opportunities through an air power lens and will enable effective joint operations by making other CAF personnel more "air aware." Moreover, the RCAF's exercise of the indivisibility of air power (enabled by the related institutional efforts towards professional air power mastery, airmindendness and greater air-to-air integration) can permit it to offer personnel with joint/combined expertise to work with the organic air arms of multinational partners' armies, navies and marines in coalition campaigns.

- **ISR** is a fundamental RCAF role and core capability for which the RCAF has a proven track record in recent coalition campaigns. An RCAF ISR niche offers great potential benefits to not only the RCAF but also the other CAF environments and coalition partners as a joint and combined force enabler and force multiplier. It could include the RCAF taking the lead in developing joint doctrine and also developing an ISR military occupational structure identification (MOS ID) specialty. However, similar to the air-advisory niche, the RCAF will need to be modest in realizing that it does not have the foundation needed to build and sustain a full ISR-capability enterprise on the lines of USAF. An RCAF ISR niche could include utilizing RPAs, but the huge benefits of a crewed aircraft (demonstrated by the example of the role played by the CP140 Aurora in recent operations) mean that procuring a multimission aircraft for the C4ISR role should remain a key Canadian military priority. Lastly, having incorporated space under the RCAF's wing offers endless ISR possibilities.

- **"Being" expeditionary** by fostering an expeditionary mindset within the RCAF and **realizing the full potential of the RCAF's air-expeditionary-wing concept** at 2 Wing will go a long way in maximizing a Canadian contribution to coalition expeditionary air campaigns. It is essential to evolve out of the ad hoc approach that previously put enormous strains on Canada's air-force personnel and equipment by developing an expeditionary concept and construct that ensures the RCAF can deploy self-contained, modular, scalable forces quickly into theatre and, therefore, not be a burden on its allies. A Canadian-tailored expeditionary capability embodied in 2 Wing's flexibility and interoperability with allies will

help make the RCAF a valued coalition partner and will enable Canadian air operations across the globe. Moreover, the full realization of the RCAF's expeditionary concept will also benefit coalition endeavours by reinforcing 2 Wing as an air expeditionary model for allied air forces to emulate.

- A **targeting** specialty that is interoperable with allies is a niche capability that the RCAF can leverage by plugging into CAOCs and potentially having Canadian air-force personnel lead allied/coalition targeting efforts. Targeting is primarily an air power activity, and it is reflective of the many advantages and challenges that face air power in the 21st century. Moreover, targeting is a key priority of both the CDS and Commander RCAF. Since the RCAF is the most inherently joint of the CAF environments, developing an RCAF targeting expertise can, therefore, be beneficial to the entire Canadian military. However, such expertise will require not only an understanding of the doctrinal fundamentals of targeting but also a comprehension of its social-cognitive political and strategic messaging challenges. Indeed, such a focus on not only the "what" but also the "where" and "why" of targeting has the potential to give the RCAF a key advantage in the narrative war / battle of narratives, to protect the Canadian centre of gravity (public will) and to empower the RCAF to conduct operations overseas.

Expeditionary air operations in today's security and defence environment have grown increasingly complex. Fiscal, personnel and other challenges necessitate greater agility and adaptability on the part of air forces to demonstrate their utility to the government and public. Outside-the-box thinking and creative approaches will, therefore, be required for the RCAF to maximize AIRPower effects in overseas operations while maintaining the first-priority requirement to safeguard Canada. A promising start has been made with clear institutional guidance in *Air Force Vectors*, the Flying in Formation vision and greater emphasis on fostering professional air power mastery. In exploring these potential niches, it is hoped that this study has contributed to such efforts by giving the RCAF ideas on potential ways ahead for expeditionary operations in support of allied coalition efforts and Canadian interests.

Biography

Dr. Richard Goette is an air power academic and Canadian Air Force historian. In the Department of Defence Studies at the CFC in Toronto, he lectures on command, air power and the RCAF. Richard also teaches CFC's Joint Command and Staff Programme and National Security Programme and is a Master of Defence Studies supervisor. He holds an honours Bachelor of Arts in history from McMaster University (Hamilton, Canada) as well as a Master of Arts and Doctor of Philosophy (PhD) in history from Queen's University (Kingston, Canada). He was awarded the Canadian DND Security and Defence Forum (SDF) master's and PhD scholarships, was a DND SDF post-doctoral fellow at the Laurier Centre for Military Strategic and Disarmament Studies (LCMSDS) in Waterloo and is currently an LCMSDS research associate. He has taught courses on command, military history, war and society as well as Canadian foreign policy for a variety of military and civilian universities in Canada.

Richard has worked in research and writing roles for DND, including the Canadian Forces Leadership Institute, the RCAF and the RCAF Aerospace Warfare Centre. He is a member of the RCAF Association and is an associate editor-in-chief of the association's flagship publication, *Airforce Magazine*. He is also an associate Air Force historian with the RCAF History and Heritage and a former vice-president of the Canadian Aviation Historical Society. Richard is currently conducting research on air power issues related to the RCAF as a professional military institution, command and control, air mobility (airlift as well as SAR), "soft" air power and the Arctic.

The author wishes to thank his Air Force students and colleagues at CFC for their advice, insights and expertise.

Abbreviations

2 ACCU	2 Air Component Coordination Unit
A2	anti-access
AAR	air-to-air refuelling
ACC	air component commander
AD	area denial
AFEC	Air Force expeditionary capability
AIRPower	agile, integrated, reach and power
AO	area of operations
ASIC	Air and Space Interoperability Council
ASPOC	Air and Space Power Operations Course
ATF	air task force
ATO	air tasking order
AWACS	airborne warning and control system
BCATP	British Commonwealth Air Training Plan
BDA	battle damage assessment
BGen	brigadier-general
C2	command and control
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CA	Canadian Army
CAF	Canadian Armed Forces
CAOC	combined air operations centre

CBC	Canadian Broadcasting Corporation
CDE	collateral damage estimate
CDS	Chief of the Defence Staff
CEFCOM	Canadian Expeditionary Force Command
CF	Canadian Forces
CFACC	combined force air component commander
CFAWC	Canadian Forces Aerospace Warfare Centre
CFC	Canadian Forces College
CFJP	Canadian Forces Joint Publication
CFMCC	combined force maritime component commander
CJOC	Canadian Joint Operations Command
CO	commanding officer
COIN	counter-insurgency
Col	colonel
CWO	chief warrant officer
DART	Disaster Assistance Response Team
DND	Department of National Defence
DRDC	Defence Research and Development Canada
DTB	*Defence Terminology Bank*
FAOC	*Future Concepts Directive Part 2: Future Air Operating Concept*
frag O	fragmentary order
HADR	humanitarian assistance and disaster relief
HQ	headquarters
IED	improvised explosive device
ISAF	International Security Assistance Force
ISIS	Islamic State of Iraq and Syria
ISR	intelligence, surveillance and reconnaissance
JAPCC	Joint Air Power Competence Centre
JIMP	joint, integrated, multinational and public

LCMSDS	Laurier Centre for Military Strategic and Disarmament Studies
LCol	lieutenant-colonel
LEGAD	legal advisor
LGen	lieutenant-general
LOAC	law of armed conflict
Maj	major
MANPADS	man-portable air defence system
MGen	major-general
MND	Minister of National Defence
MRTT	multirole tanker transport
MSS	mission support squadron
NFTC	NATO Flying Training in Canada
NGO	non-governmental organization
NSL	no-strike list
OGD	other government departments
op	operation
OUP	Operation UNIFIED PROTECTOR
PGM	precision guided munition
PhD	Doctor of Philosophy
PME	professional military education
PSO	peace support operation
RAAF	Royal Australian Air Force
RAdm	rear-admiral
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RCN	Royal Canadian Navy
RMA	revolution in military affairs
ROE	rules of engagement
RPA	remotely piloted aircraft
RTP	responsibility to protect

SAM	surface-to-air missile
SAR	search and rescue
SCAR-C	strike coordination and reconnaissance – coordinator
SDF	Security and Defence Forum
SEAD	suppression of enemy air defences
SME	subject matter expert
SOF	special operations forces
TEA	target engagement authority
UN	United Nations
UNSCR	United Nations Security Council Resolution
US	United States
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
WoG	whole-of-government

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