





### **RCAF SUPPORT FOR ARCTIC SAR: ARE WE THERE YET?**

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# JCSP 47

# **Service Paper**

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#### **RCAF SUPPORT FOR ARCTIC SAR: ARE WE THERE YET?**

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# RCAF SUPPORT FOR ARCTIC SAR: ARE WE THERE YET? AIM

1. Strong, Secure, Engaged (SSE): Canada's Defence Policy presents the strategic vision for the Canadian Armed Forces. Part of this vision includes being strong at home and secure in North America.<sup>1</sup> Executing this vision requires the Royal Canadian Air Force (RCAF) to be able to conduct search and rescue (SAR) activities in support of domestic operations and in support of the NORAD partnership. It is the aim of this paper to examine the Royal Canadian Air Force's ability to support the Canadian Government by defending the Arctic through fighter-support activities such as search and rescue as well as providing support on domestic SAR missions.

### **INTRODUCTION**

1. The Canadian Arctic is a vast but largely uninhabited area. According to the Arctic Institute website, Canada's Arctic region represents roughly 40% of its landmass covering over 3.8 million square kilometres of land and with 162,000 km of coastline.<sup>2</sup> This area also represents significant opportunities for future oil, gas, and mineral exploration. The US Geological Survey department has predicted that the Arctic may contain up to 30% of the world's gas resources and 13% of the world's oils reserves.<sup>3</sup> These reserves, along with the rapidly increasing accessibility of the Arctic due to climate change, are increasing traffic in and around the Arctic as well as demonstrating its vulnerabilities. Besides providing an abundance of resources, the Arctic also provides a physical barrier between North America and external threats.

2. The North American Air Defence (NORAD) Command was formed in 1958 and was designed to defend North American airspace from external air threats such as Russian Long-range Aviation Bombers and intercontinental ballistic missiles.<sup>4</sup> NORAD continues to launch fighter aircraft such as the F-15, F-16, CF-188, F-22 and F-35s in response to Russian aircraft which are attempting non-authorized penetration of the North American Air Defence Identification Zone. To properly defend North America and deter adversaries from presenting aerospace threats, the fighter aircraft NORAD deploys require support from other assets which enable the speed, reach, and safety of these activities. This paper will first examine the challenges of conducting operations in the North. Then, in an effort to support its contribution to NORAD, this paper will examine operational limitations the RCAF must overcome with its current ability to support fighter operations through its contributions to SAR missions. While this paper provides an examination of the RCAFs overall SAR capability, the capability to provide SAR

<sup>&</sup>lt;sup>1</sup> Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa: DND Canada, 2017. 14.

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

<sup>&</sup>lt;sup>3</sup> Kenneth J.Bird, Ronald R. Charpentier, Donald L.Gautier, Houseknecht, David W., Klett, Timothy R., Pitman, Janet K., Moore, Thomas E., Schenk, Christopher J., Tennyson, Marilyn E. and Wandrey, Craig J., 2008, Circum-Arctic resource appraisal; estimates of undiscovered oil and gas north of the Arctic Circle: U.S. Geological Survey Fact Sheet 2008-3049, 4 p. http://pubs.usgs.gov/fs/2008/3049/.

<sup>&</sup>lt;sup>4</sup> North American Aerospace Defense Command. *A Brief History of NORAD*. "About NORAD." last accessed January 23, 2021. https://www.norad.mil/About-NORAD/. 5-6.

operations in the Arctic directly relates to its capacity to provide rescue support to fighter operations.

## DISCUSSION

### Challenges in the North

3. The size and remoteness of Canada's Arctic region present significant challenges when it comes to National Defence. In addition, climate change is rapidly opening up waterways increasing marine accessibility to parts of the Arctic that were previously only accessible by air. Increased accessibility not only increases the volume of people transiting or exploring the North, it also increases the potential requirement for search and rescue operations in the Arctic. Harsh weather conditions in the North also present challenges to conducting search and rescue operations. Average winter temperatures in the Arctic range from a frigid -20 to -35 degrees Celsius with unpredictable weather patterns in the winter creating low visibilities due to high winds and snow storms.<sup>5</sup> The harsh climate of the Arctic decreases the time frame required to rescue personnel in the north, as chances of survival are greatly affected by exposure to elements, such as freezing temperatures and strong winds. General Natynczyk, former Chief of Defence Staff noted the challenges of operating in the Arctic. "We are challenged more by operating in our own domain than in operating around the world ... It is harder to sustain operations in our High Arctic than it is to sustain operations in Kandahar or Kabul because in the Arctic, it's what you bring."<sup>6</sup>

#### Search and Rescue Agreements in the Arctic

4. In 2011, members of the Arctic Council signed the *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic*. This agreement was made to strengthen the relationship between the seven member states and delineate the regions of responsibility for each member.<sup>7</sup> The articles in this agreement were designed to promote cooperation, provide training opportunities and identify SAR resources available in each region. The agreement does not mandate what resources must be available, nor does it stipulate SAR timelines which must be maintained. The agreement is important as it has demonstrated that the states are able to differentiate between dimensions of their interstate relationships. For example, events surrounding the annexation of Crimea did not interfere with the relationships established in this SAR agreement.<sup>8</sup> From a Canadian perspective, the strongest relationship for SAR remains with the United States (US), as it routinely conducts exercises with the US for search and rescue operations.<sup>9</sup>

<sup>&</sup>lt;sup>5</sup> The Arctic Institute. "Canada." last accessed January 22, 2021. https://www.thearcticinstitute.org/countries/canada/.

<sup>&</sup>lt;sup>6</sup> Up Here Publishing. "The Rescue That Went Wrong.. last accessed January 20, 2021. https://www.uphere.ca/articles/rescue-went-wrong-0.

<sup>&</sup>lt;sup>7</sup> Arctic Council. 2011. "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic." Nuuk: Arctic Council, 05 12. 4.

<sup>&</sup>lt;sup>8</sup> Michael Byers, and Nicole Covey. "Arctic SAR and the 'Security Dilemma."" *International Journal: Canada's Journal of Global Policy Analysis* 74, no. 4 (December 2019): 506.

<sup>&</sup>lt;sup>9</sup> Donna Mills U.S., Canadian Forces Exercise Arctic Search-and-Rescue Ops. Washington: Federal Information & News Dispatch, LLC, 2013.

#### **Canadian Search and Rescue Response Options**

5. The Canadian Government provides SAR services through the Canadian Coast Guard, the Royal Canadian Mounted Police and the Canadian Armed Forces (CAF). The RCAF is responsible for the aerial component of the CAF's SAR mandate. The RCAF is well suited to conducting SAR missions in the Arctic due to the characteristics of airpower such as speed and reach. When compared to Coast Guard vessels, RCAF aircraft have the ability to cover larger areas in a specified period of time. This is accomplished through the operations of five different squadrons located across the southern regions of Canada. These squadrons utilize a fleet of fixed wing aircraft and helicopters to provide coverage to Canada's SAR area of responsibility. In addition to these assets, all other RCAF aircraft maintain SAR as a secondary role.<sup>10</sup> Coordination of SAR operations is done through the appropriate regional Joint Rescue Coordination Centre (JRCC). The JRCC has the ability to request search and rescue support from any of the available squadrons, as well as request assistance from other Canadian government organizations such as the RCMP, Canadian Coast Guard, Canadian Rangers and Parks Canada.<sup>11</sup>

#### **Current Search and Rescue Limitations**

6. Current RCAF search and rescue missions are limited by the current location of SAR squadrons and the number of aircraft available to conduct operations. For example, the North Pole is located within Canada's area of responsibility as designated in the Arctic Council agreement. The squadron responsible to respond to this location is 435 Squadron located in Winnipeg, Manitoba. Direct flight distance between the two locations is approximately 2400 nautical miles. This is the equivalent distance as stationing an aircraft in Frankford, Germany to respond to a rescue in Newfoundland.<sup>12</sup> Flight time between the two locations in a no wind environment is approximates nine hours and fifteen minutes. However, the new Airbus C295 aircraft recently procured by the RCAF does not have the range to conduct this mission without stopping to refuel.<sup>13</sup> So it is likely that any mission could not be conducted in a single crew day, depending on which locations were available in the Arctic for the aircraft to remain overnight for crew rest. The timelines to place a helicopter on the scene of a rescue in the Arctic is even worse, as the speed and range of the Cormorant helicopter requires multiple fuel stops to arrive in the Arctic, and cannot conduct the mission in a single day. If a pilot on a

<sup>&</sup>lt;sup>10</sup> Canada. Department of National Defence. "RCAF website" last accessed 20 January, 2021, https://www.rcaf-arc.forces.gc.ca/en/search-rescue.page

<sup>&</sup>lt;sup>11</sup> Ibid.

<sup>&</sup>lt;sup>12</sup> Pierre Leblanc. "Canada's Northern People Deserve Better Arctic SAR Capabilities." The Maritime Executive, last updated 03 Oct 2018, 2.https://www.maritime-executive.com/editorials/canada-snorthern-people-deserve-better-arctic-sar-capabilities

<sup>&</sup>lt;sup>13</sup> Airbus Military. "C295 Search and Rescue: the proven, reliable and low risk solution." Airbus Military, 3. last accessed 21 Jan 2021. https://archive.is/20130115192346/http://www.c295.ca/c-295-canadiansar/specifications/

NORAD mission were to require rescue in the Arctic, it would require days, not hours, for the pilot to be extracted from the area.<sup>14</sup>

#### **Future Search and Rescue Options**

The RCAF does not currently have a permanent SAR capability in the Arctic to 7. respond to NORAD or domestic operations. Setting up a permanent (year-round), or semi-permanent (peak SAR season) location in the Arctic would minimize the response times for Arctic SAR missions, as well as provide a military presence in the North. This option is not detailed or funded in SSE. This option is in alignment with the US strategy where the US Coast Guard positions additional air assets in Alaska during the busy season to ensure it is capable of responding to calls in a timely manner.<sup>15</sup> RCAF could rotate crews and helicopters through the deployed location in order to avoid desolate postings, and enable the crews and equipment to maintain currencies when not deployed north. The CAF could also use a SAR forward operating location (FOL) as an opportunity to strengthen its working relationship with the Canadian Rangers, as well as strengthen relations with Canada's Northern most residents. The aircraft most suited to operating from an Arctic FOL would be the Cormorant helicopter, which is currently only in-service on the east and west coasts, due to their limited numbers and high maintenance requirements. As the Cormorant fleet undergoes its mid-life refit, serviceability rates will stabilize and aircraft will be available to deploy north.<sup>16</sup>

8. The CH-149 Cormorant is a very capable search and rescue aircraft given that it is capable of operating in extreme weather conditions, has a de-ice system enabling it to operate in airframe icing conditions, and has a true airspeed of 150 knots.<sup>17</sup> The aircrafts largest limitation with respect to operating in the Arctic is its limited 550 nautical mile range.<sup>18</sup> Not only does this range limit the distance the aircraft can travel without having to stop and refuel, it also increases the time it takes to arrive at a destination, due to the time it takes to stop, shutdown, and refuel the helicopter. The most effective method of increasing the range of a helicopter is to enable it to be refueled while airborne. The Cormorant is able to be refit as an aerial refueling receiver aircraft, given that it is a variant of the EH-101 platform.<sup>19</sup> Enabling the Cormorant to conduct aerial refueling will not only extend its range, it will also decrease the time required to arrive at the rescue location. The RCAF currently has one aircraft capable of operating as a helicopter AAR tanker. This aircraft is the Hercules CC130T. This aircraft is at the end of its service life

<sup>&</sup>lt;sup>14</sup> Up Here Publishing. "The Rescue That Went Wrong." last accessed January 20, 2021. https://www.uphere.ca/articles/rescue-went-wrong-0.

<sup>&</sup>lt;sup>15</sup> Pierre Leblanc. "Canada's Northern People Deserve Better Arctic SAR Capabilities." The Maritime Executive, last updated 03 Oct 2018, 2.https://www.maritime-executive.com/editorials/canada-snorthern-people-deserve-better-arctic-sar-capabilities

<sup>&</sup>lt;sup>16</sup> Canada, "Government of Canada invests in modernizing and growing its CH-149 Cormorant search and rescue fleet," Government of Canada, 22 August 2019, https://www.canada.ca/en/department-national-defence/news/2019/08/government-of-canada-invests-in-modernizing-and-growing-its-ch-149-cormorant-search-and-rescue-fleet.html (accessed 20 January 2021).

<sup>&</sup>lt;sup>17</sup> Canada. Department of National Defence. "CH-149 Cormorant | Aircraft | Royal Canadian Air Force," April 10, 2013. http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/ch-149.page.

<sup>&</sup>lt;sup>18</sup> Ibid.

<sup>&</sup>lt;sup>19</sup> Army Technology. https://www.army-technology.com/projects/aw101/

and the RCAF would have to replace it with the newer Hercules KC130J variant, as part of the next generation strategic air-to-air tanker-transport capability project identified and funded in SSE.<sup>20</sup> The Alaska Air National Guard and United States Air Force has had success employing an AAR receiver capable helicopter for Arctic SAR operations. These organizations currently operate HH-60G Pave Hawk helicopters and HC-130 Hercules aircraft out of Joint Base Elmendorf-Richardson, Anchorage, Alaska, to provide combat SAR, as well as domestic SAR services to the remote areas in and around Alaska.<sup>21</sup>

9. The procurement of a tilt-rotor aircraft such as the Boeing V-22 Osprey would be another suitable option for arctic SAR operations. The Osprey's range of 1000NM and speed of 270 knots is roughly double that of the Cormorant helicopter currently used by the RCAF.<sup>22</sup> The Osprey can also take advantage of transiting at higher altitudes, which enables it to take advantage of tailwinds, as well as to fly above weather such as icing and other conditions, which can restrict flight operations. The Osprey is capable of being refueled during flight, so its response time to a rescue location is also minimized. There are several factors which detract militaries from using the Osprey as a SAR asset. Firstly, the 85 million dollar price tag makes it substantially more expensive than other SAR platforms.<sup>23</sup> Another limitation for the Osprey is its ability to conduct hoisting operations. The Osprey is fitted with a hoist above the rear ramp of the aircraft, but the relatively small size of the rotor blades require faster rotational speeds which create an unpredictable downwash during hoisting operations.<sup>24</sup>

10. Contracted Arctic SAR would provide a short-term solution to the RCAFs current SAR capability gap. This is an option that the Australian Maritime Safety Authority (AMSA) executed when it contracted part of its SAR services to a private contractor.<sup>25</sup> The Australian Auditor-General determined that AMSA was able to define the requirements for the SAR capability required, and the contract was properly executed as directed within the budget and timeline stipulated. Canada has many options for established companies which provide this service. Cougar Helicopters currently provides SAR services to offshore oil and gas companies with a fleet of Sikorsky S-92 aircraft, and possesses the operational experience to augment the RCAFs Arctic SAR capability.<sup>26</sup> Although contracting SAR services in the Arctic does not increase the SAR capability possessed by the RCAF, it would allow the RCAF to focus its limited resources on the more densely populated regions of Canada.

<sup>&</sup>lt;sup>20</sup> Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa: DND Canada, 2017, 39.

<sup>&</sup>lt;sup>21</sup> JBER Aircraft Factsheets. *Joint Base Elmendorf-Richardson*. Accessed 24 January 2021. https://www.jber.jb.mil/Info/Fact-Sheets/

<sup>&</sup>lt;sup>22</sup> "Boeing: V-22 Osprey." last accessed January 22, 2021. http://www.boeing.com/defense/v-22-osprey/#/technical-specifications.

<sup>&</sup>lt;sup>23</sup>John M. Groves and Marine Corps Command and Staff College Quantico VA. A Combat Search and Rescue (CSAR) Role for the CV-22: It's Coming, Get Ready. 2008. 6.

<sup>&</sup>lt;sup>24</sup> Ibid., 6.

<sup>&</sup>lt;sup>25</sup> Mirage News. "Auditor-General Report Finds AMSA Search and Rescue Contract Management Fully Effective | Mirage News," January 21, 2021.

<sup>&</sup>lt;sup>26</sup> "Cougar Helicopters Inc." last accessed January 22, 2021. https://www.cougar.ca/what-we-do.html.

## CONCLUSION

11. Strong, Secure, Engaged has directed the CAF to remain strong at home and secure in North America. As environmental changes increase the accessibility of the Arctic, the RCAF must both increase its presence and ability to respond to SAR missions in the northern latitudes. The Arctic presents challenges and opportunities for economic development, tourism, with these activities increasing the frequency for which the RCAF will have to respond to SAR events. The RCAF must also be prepared to support NORAD activities by providing SAR support to fighter aircraft. Limitations have been identified within the RCAF SAR capability. Most notably, although the RCAF is capable of responding to a location to conduct search operations within the crew day limitation as recommended, it does not possess the capability to provide a platform capable of conducting rescue operations in a reasonable time. The RCAF must address these limitations in order to fulfill the strategic guidance provided by the SSE defence policy.

# RECOMMENDATIONS

12. Identify suitable location for Arctic SAR operating base. Rotate SAR crews and assets through the Arctic location during the peak SAR season to provide quicker SAR response times as well as develop relationships with local indigenous leaders. Conduct exercises with local Canadian Rangers. Establish operating presence in the Arctic.

13. Explore options with other L1 organizations to determine requirements for a multi-role multi-aircraft combination such as the KC130J and V-22 aircraft which could be called upon when required for SAR operations, and also capable of transporting ground troops throughout the Arctic, as part of an Arctic defensive posture.

14. Explore options to contract Arctic SAR operations as an interim solution until funding can be secured and additional SAR assets can be procured.

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