

CANADIAN ARCTIC SEARCH AND RESCUE: AN ASSESSMENT

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## **Abstract**

This paper is a policy assessment of Canada's search and rescue system with the purpose of examining to what extent Canada's search and rescue resources are able to meet growing Arctic search and rescue demands. This assessment consists of three main sections. The first examining search and rescue in general; its structure, operation, rescue needs, as well as the country's search and rescue capacity and capabilities. The second section specifically explores Arctic search and rescue, including its challenges and evaluated its future activity; with the third and final section investigating the available options for improving search and rescue in Canada. Essentially, Canada's system was found to adequately meet general search and rescue requirements, however, it was found to be labouring to sustain itself and does not possess the capacity to withstand any substantial changes in need. Consequently, the system is finding it increasingly difficult to provide adequate and timely search and rescue services to the Arctic region; especially due to its remote, harsh and complex environment. Therefore as the Arctic's rescue needs grow, the current system will increasingly be unable to meet them. As a result, without adjustments to Canada's search and rescue system, it will lack the capacity to meet growing search and rescue demands in the Arctic.

## **Introduction**

Search and Rescue (SAR) is an essential service provided to all Canadian communities, no matter where they are located. However, Northern communities represent a particular challenge to SAR capabilities in Canada due to their limited or lack of infrastructure, sparse and isolated populations, unique environmental challenges, and distances needed to travel from southern operating bases to provide SAR services in the North. Arctic climate requires the equipment used in SAR operations to be able to function properly in extremely cold temperatures and icing conditions, as well as operate on short, rough, icy and soft runway situations. Adding to these challenges, the Arctic is in a state of transition and may require greater SAR capabilities as environmental changes occur in the region. Climate change is seeing a continued reduction in ice and the opening up of Arctic waters for longer periods of time. This evolution in the environment is expected to lead towards greater human activity in the region through resource extraction and new navigable trade routes. However, travel in this region will continue to be both difficult and dangerous with shifting and shallow sea routes, severe cold, and unpredictable Arctic storms, all of which cause the majority of accidents in the region. Therefore, as Arctic waters continue to open and allow for greater and longer navigability in this icy, remote and hazardous region, the need for SAR capabilities will also increase.

This paper will serve as a policy assessment with the purpose of examining to what extent Canada's SAR resources are sufficient to meet its SAR needs. In particular, I will be addressing the question of whether or not Canada will be able to meet growing Arctic SAR demands. The Arctic is changing; consequently the policies pertaining to it must also change if they are to remain relevant and effective. The difficulties associated with Arctic SAR are generational issues that will not disappear and may even worsen over time, jeopardising the ability to meet this northern region's current and future human security needs. As a result, this

assessment of Canadian Arctic SAR will evaluate several sub-factors such as Canada's present SAR needs; its current SAR capacity and capabilities; assess future activity, as well as evaluate viable options to improve SAR in Canada. The general structure of this paper will consist of three main parts. The first consisting of SAR in general; its structure, how it operates, the frequency of operations, as well as the country's SAR capacity and capabilities. The second part will specifically explore SAR in the Arctic, such as its challenges and its future activity. Finally, the third section will be dedicated to exploring available options for improving SAR in Canada and which of these possibilities would represent the most feasible and sustainable way forward for the country.

### **SAR in Canada**

SAR in Canada involves coordinating and conducting marine, air, and ground searches for people in distress; providing and administering first aid at rescue locations; and transporting injured people to the hospital. This service and capability is provided through a 'system of systems' where resources of the federal, provincial/territorial, and municipal governments, along with the private sector and volunteers, work together to respond to search and rescue emergencies. In this arrangement, marine and air operations fall under federal responsibility while ground operations are the collective duty of the province/territory and municipal governments. Under this current decentralized system, it is essential that there be a high degree of collaboration and cooperation between search and rescue actors so as to provide an effective, efficient, and successful SAR service to the population. Although these qualities are crucial to any country's SAR capabilities, they are particularly vital in the Canadian context as Canada

possesses one of the world's largest and most difficult areas in which to conduct SAR operations.<sup>1</sup>

The Canadian area of responsibility within which SAR teams must operate comprises of 18 million square kilometres including land and water, more than 243,800 kilometres of coastline, three oceans, three million lakes counting the Great Lakes, and the St. Lawrence River system.<sup>2</sup> This vast area poses a significant challenge for SAR workers which is further compounded by the fact that many areas of the country are uninhabited or sparsely populated, have varied and difficult terrain, and experience extreme weather conditions.<sup>3</sup> On average, over the course of the year, there are over 15,000 calls for SAR assistance nation-wide with an excess 25,000 people receiving assistance.<sup>4</sup> In a recent audit of federal SAR abilities, Auditor General Michael Ferguson concluded that SAR capabilities were able to adequately respond to air and marine SAR incidents; however, "significant improvements are needed if they are to continue to adequately respond and provide the necessary personnel, equipment, and information systems to deliver SAR activities effectively."<sup>5</sup> Personnel shortages, inadequate training, ageing equipment and information systems, and the lack of a national policy framework were cited as the main hindrances to continued SAR operational effectiveness.

For the purpose of this section, I will be analysing Canada's current SAR system. Specifically, I will be exploring how SAR is structured and operates under the National Search and Rescue Program. It will also be here that I will establish the demand for services that is placed on this program, identify system stress points, as well as how the country's SAR capacity

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<sup>1</sup> Auditor General of Canada, "Federal Search and Rescue Activities," in *2013 Spring Report of the Auditor General of Canada to the House of Commons*, Ottawa: Office of the Auditor General of Canada, 2013: 3.

<sup>2</sup> Department of National Defence, "Quadrennial Search and Rescue Review – Report," *National Search and Rescue Secretariat*, last modified December 20, 2013. <http://www.nss.gc.ca/en/quadrennial-review>: II

<sup>3</sup> Ibid.

<sup>4</sup> Department of National Defence, "Quadrennial Search and Rescue Review": II

<sup>5</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 25.

and capabilities are deteriorating due to staffing and training challenges, ageing equipment, failing information systems, and lack of governance.

### ***Canada's National Search and Rescue Program (NSP)***

In Canada, SAR is a shared responsibility among all levels of government and also includes volunteer air, maritime, and ground SAR organizations. Together these actors provide SAR services to the Canadian public and are consequently involved in Canada's NSP. Essentially, the NSP is a "horizontal program that integrates organizations and resources that are involved in the provision of SAR services to Canadians, and includes SAR response and prevention".<sup>6</sup> This program is led by the Minister of National Defence who is also the lead minister for SAR. In order to support the Minister with the NSP, the National Search and Rescue Secretariat (NSS) was established in 1986 as an independent body within the Department of National Defence.<sup>7</sup> This Secretariat serves as the central coordinator and manager of the NSP and is accountable to the Minister of National Defence. Among its various tasks, the three main responsibilities of the NSS are: the development and coordination of a national SAR policy framework through consultations with SAR partners; to support and promote NSP activities as a method of achieving efficient and effective SAR programs in Canada; and to work with SAR partners in the development and standardization of SAR service in Canada.<sup>8</sup> It should also be noted that the executive director of the Secretariat serves as chair to the federal Interdepartmental Committee on SAR, a committee responsible for advising the Government of Canada and the Minister of National Defence on Canadian SAR issues.<sup>9</sup>

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<sup>6</sup> Department of National Defence, "Search and Rescue Canada," *National Defence and the Canadian Armed Forces*, last modified September 24, 2013. <http://www.forces.gc.ca/en/operations-canada-north-america-current/sar-canada.page>.

<sup>7</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 3.

<sup>8</sup> Department of National Defence, "Search and Rescue Canada"

<sup>9</sup> Ibid.

The partners providing SAR services to Canadians, i.e. the federal, provincial/territorial, and municipal governments along with volunteer SAR organizations, each have a specific role in the NSP. In this program, the federal government is responsible for all aeronautical and maritime SAR services which are primarily managed by the Canadian Forces (CF) and the Canadian Coast Guard (CCG) respectively. To coordinate the federal response, the CF and the CCG have divided Canada's area of responsibility into three Search and Rescue Regions (SRR), each of which possesses a Joint Rescue Coordination Centre (JRCC).<sup>10</sup> These centres are responsible for the planning, coordinating, conducting, as well as the controlling of SAR activities within their particular SRR.<sup>11</sup> The three JRCCs are located in Halifax, Trenton, and Victoria, and are staffed around the clock by both CF and CCG SAR personnel.<sup>12</sup> The current SRR boundaries and JRCC locations were both created based on nation-wide incidence distribution trends to allow for the strategic placement of SAR resources in close proximity to concentrated incident areas.<sup>13</sup> This has also allowed for an even distribution of the average 9000 SAR operations between the SRRs and translates to each JRCC responding to roughly 3000 air and marine incidents every year.<sup>14</sup> It is important to note that these SRR and JRCC locations were established to facilitate aeronautical and maritime SAR responses and resources only, as ground SAR operations are not a federal responsibility and operate under a different organizational system.

Ground SAR operations fall under the legal authority of the provincial and territorial governments. Despite some provincial differences in legislative and regulatory organization of SAR, provincial authorities have, for the most part, delegated SAR responses to local law enforcement agencies to coordinate operations within their jurisdictions; be it the RCMP, the

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<sup>10</sup> Department of National Defence, "Quadrennial Search and Rescue Review": IV

<sup>11</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 4.

<sup>12</sup> Department of National Defence, "Quadrennial Search and Rescue Review": IV

<sup>13</sup> ---, "Search and Rescue Canada"

<sup>14</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada," (2011) <http://colinkenny.ca/en/resources/media/Improving%20SAR%20response%20%20A%20discussion%20paper.doc>: 4

provincial police force, or the local police force.<sup>15</sup> Unlike the federal government, provincial, territorial and local municipal governments are unable to maintain personnel used exclusively for SAR due to a lack of funds and resources; although many have developed specialized capabilities within their police, fire and ambulance forces.<sup>16</sup> Therefore, because of limited resources, ground SAR is heavily reliant upon volunteer SAR organizations to aid in operations as they offer additional man-power, capabilities, and knowledge.

Volunteer organizations are an important component to Canada's NSP as they provide aid to all levels of government in the provision of SAR services. The three main national SAR volunteer organizations are: the Civil Air Search and Rescue Association (CASARA), the Canadian Coast Guard Auxiliary (CCGA), and the Search and Rescue Volunteer Association of Canada (SARVAC). CASARA is funded by the CF to increase its capacity to respond to air incidents nation-wide through the use of private aircraft and volunteer crews trained in search and communication services.<sup>17</sup> CASARA also has a Memoranda of Understanding with all the provinces and territories to provide them with air search capabilities when needed.<sup>18</sup> The CCGA is a CCG funded nation-wide maritime volunteer service that increases the CCG's capacity to respond to marine SAR incidents. The third organization, SARVAC, is a not-for-profit volunteer organization giving a national-voice to ground SAR as well as providing ground SAR services and training in Canada's provinces and territories.<sup>19</sup> Together these three SAR organizations provide greater resources and support to SAR governing authorities in the provision of SAR services nation-wide.

The NSP's decentralized system divides responsibilities allowing for varied and complimentary SAR approaches and capabilities between the levels of governments and

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<sup>15</sup> Department of National Defence, "Search and Rescue Canada"

<sup>16</sup> ---, "Quadrennial Search and Rescue Review": IV

<sup>17</sup> Department of National Defence, "Search and Rescue Canada"

<sup>18</sup> ---, "Quadrennial Search and Rescue Review": IV

<sup>19</sup> Ibid.

volunteer organizations, creating a fluid and flexible system that is able to meet Canada's SAR challenges.<sup>20</sup> In other words, SAR in Canada is a 'system of systems' where SAR services are multi-jurisdictional and each authority has its own SAR system which together provides a countrywide SAR service.<sup>21</sup> Although this federal SAR system has given Canada the reputation as having one of the most effective SAR services in the world, having achieved a 96.2 percent success rate between 2000 and 2004, the system requires further improvements.<sup>22</sup> Despite the success of this current federal system, stress points and areas of concern posing significant risks to the continued and future SAR operational success and readiness have been identified.

### *Canada's Deteriorating SAR Capacity and Capabilities*

The *Report of the Auditor General of Canada* in the spring of 2013 included a chapter on SAR activities at the federal level. Although the audit concluded that the overall federal SAR activities have been able to successfully respond to both air and maritime SAR needs, the report warns that significant improvements are necessary for maintaining sufficient SAR services.<sup>23</sup> According to the report, inadequate numbers of trained staff, ageing equipment, a failing information system, and the absence of a governance system are factors posing significant risks to the sustainability of SAR operational capacity and capabilities of Canada's SAR system.<sup>24</sup>

### *Staffing and Training Challenges*

The provision of SAR services across Canada is dependent upon there being sufficient numbers of qualified human resources as well as capable equipment which has been properly maintained. These two factors currently represent the greatest threats to both present and future SAR operations. For the past decade, the CCG, and the CF's Royal Canadian Air Force (RCAF)

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<sup>20</sup> Ibid: V

<sup>21</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 5.

<sup>22</sup> Fisheries and Oceans Canada, "Search and Rescue Needs Analysis, 2007," *Canadian Coast Guard*, last modified July 9, 2013. [http://www.ccg-gcc.gc.ca/e0003782#\\_Toc204749662](http://www.ccg-gcc.gc.ca/e0003782#_Toc204749662).

<sup>23</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 25.

<sup>24</sup> Ibid: 2.

have suffered from SAR personnel shortages and training challenges. Specifically, the CCG faces challenges regarding the recruitment of marine coordinators to work at JRCC, maintaining and providing training to adequate numbers of rescue specialists, as well as providing SAR training to commanding officers.<sup>25</sup> Part of the shortage in crew and commanding officer SAR training is due to the fact that the SAR courses in question have been inconsistently provided combined with the absence of documenting the personnel who have received training and ensuring these numbers align with CCG SAR policies.<sup>26</sup> While the CCG is plagued by recruitment challenges and inconsistently delivered SAR training, the RCAF has its own unique staffing and training obstacles.

The RCAF's staffing levels, despite being at the targeted personnel level, are not sufficient enough to cover absences due to training, illness, parental leave, or vacation; as a result, the RCAF SAR squadrons are chronically understaffed.<sup>27</sup> Aircrew generation and maintenance is heavily dependent upon the consistency of training and exposure to operation, according to Stephen Reid, an experienced CF SAR helicopter pilot and former SAR advisor to the Chief of Air Staff.<sup>28</sup> When experiencing fleet problems which reduce aircraft availability, it becomes a challenge to receive training while also maintaining operational readiness. This is the current reality facing the RCAF, there is not enough aircraft available for training aircrew, as a result, the training of new recruits and retraining of existing crew has been delayed.<sup>29</sup> This is further exacerbated by the fact that many of the experienced personnel have retired, exposing a

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<sup>25</sup> Ibid: 14.

<sup>26</sup> Ibid: 13-14.

<sup>27</sup> Colin Kenny, "Canada's search-and-rescue dodge." *National Post*. May 13, 2013, accessed January 29, 2014. <http://fullcomment.nationalpost.com/2013/05/13/kenny-for-monday/>.

<sup>28</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada": 14.

<sup>29</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 12.

demographic gap created by the lack of recruiting in the 1990s.<sup>30</sup> This places increased pressure on lesser experienced air crew to perform operations, supervise and train new recruits.

### *SAR Vessels and Aircraft*

The CCG has 48 SAR lifeboats, additional summer month SAR crafts, as well as the capability of tasking any CCG vessel as a SAR vessel.<sup>31</sup> Improvements and additions to CCG SAR vessels have been made in recent year with the procurement of five new SAR lifeboats for the replacement of three older ones with additional plans in place for the further replacement of SAR lifeboats.<sup>32</sup> Contrary to the CCG's well maintained and operational fleet, the RCAF suffers from ageing and maintenance prone aircraft. As a whole, Canada's SAR aircraft have not been sufficiently replaced, causing substantial expenses and challenges to fleet sustainability.

### *Fixed-Wing Aircraft*

The RCAF possesses both fixed-wing and rotary-wing SAR capabilities. Its fixed-wing fleet consists of six CC-115 Buffalo and 13 CC-130H Hercules airplanes. Though both planes presently meet most operational requirements, they are aged aircrafts that are putting not only SAR personnel at risk, but also the Canadian public as increased maintenance requirements are reducing fleet availability, reliability, and increasing operational expenses. The Buffalo was acquired in 1967 and following more than 45 years of service, has become increasingly difficult to maintain as spare parts have become scarce.<sup>33</sup> The extensive repairs that are necessary for this airplane to remain airworthy are problematic as it reduces the number of aircraft available for SAR missions. The Auditor General notes in his audit of federal SAR capabilities that in 2011,

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<sup>30</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada": 14

<sup>31</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 15.

<sup>32</sup> Ibid: 16.

<sup>33</sup> Michael Byers and Stewart Webb, "Search and Replace: the case for a Made-in-Canada Fixed-Wing Search and Rescue Fleet," *Canadian Centre for Policy Alternatives*, (2012):7.

the Buffalo airplanes were “unavailable for SAR on 119 occasions, and in five of these cases there were no SAR replacement airplanes to perform SAR missions.”<sup>34</sup> There are plans to keep the Buffalo aircraft operational until 2015; however, for them to remain airworthy longer they will require new engines, something that the DND has stated it is not prepared to do.<sup>35</sup>

The Hercules, like the Buffalo, is also nearing the end of its service life as it is now over 20 years old and becoming maintenance prone with two of its planes receiving new wings so as to remain operational.<sup>36</sup> Of the 13 Hercules aircrafts, there are two at any given time in deep maintenance and “it takes all 11 available remaining SAR Hercules airplanes to maintain SAR operations.”<sup>37</sup> As a result, the Hercules is also expected to soon become unserviceable and is currently scheduled for retirement in 2017. In anticipation of withdrawing both the Buffalo and Hercules aircrafts from service, the Fixed-Wing Search and Rescue (FWSAR) program concerning the procurement of new FWSAR aircraft officially began in 2002 with an anticipated delivery of 15 replacement aircraft by 2006; however, due to program delays and accusations of specification rigging leading to the rewriting of the Statement of Operational Requirements, the arrival of new FWSAR aircraft has been deferred until 2017 at the earliest.<sup>38</sup> This is problematic not only for the continued provision of FWSAR services in Canada, but for the RCAF’s sustainment of this capability as the current fleet of FWSAR aircraft are slated to begin retiring with the Buffalo airplane in 2015 followed by the Hercules in 2017. This will not only create a two year gap in some of Canada’s FWSAR services, but also leave no transition period for personnel to train and become proficient on the new fleet as well as become adept to using any new SAR sensor and data management technologies. It is interesting to note that while the RCAF

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<sup>34</sup> Auditor General of Canada, “Federal Search and Rescue Activities”: 17.

<sup>35</sup> Defense Industry Daily, “Rescue Required: Canada’s Search-And-Rescue Aircraft Program,” Defense Industry Daily. *RSS News*. 3 Sept. 2013, Accessed March 21, 2014. <<http://www.defenseindustrydaily.com/rescue-required-canadas-searchandrescue-aircraft-program-03350/>>.

<sup>36</sup> Defense Industry Daily, “Rescue Required.”

<sup>37</sup> Auditor General of Canada, “Federal Search and Rescue Activities”: 17.

<sup>38</sup> Jim Dorschner, “FWSAR Plus: A Way Forward,” *Canadian Military Journal* 12, no. 4 (2012): 58-59.

continues to struggle to maintain its Hercules 130H SAR planes, the RCAF's new and up-to-date C130J Hercules has been reserved for tactical military lift.<sup>39</sup> This is at odds with the *Canada First Strategy* to put Canada 'first'.

#### Rotary-Wing Aircraft

Canada has two rotary-wing aircrafts dedicated to SAR: the CH-149 Cormorant and the CH-146 Griffon helicopter. The Cormorant is a very capable helicopter due to its range, speed, capacity and hover performance; however, several of the government's decisions have resulted in a decrease in its search proficiency and overall availability.<sup>40</sup> Based purely on fiscal constraint, sensors like the Forward Looking Infrared which enhance search capabilities were removed from the equipment list, the fleet was not 'marinized' through the application of a corrosion prevention coating, and fleet size was reduced to the lowest possible denomination for the provision of SAR services.<sup>41</sup> As a result, the current fleet of Cormorants are not only less equipped to perform searches, but are experiencing difficulties in maintaining operational readiness as corrosion, due to salt water, has increased maintenance needs limiting the availability of an already skeletal fleet. These readiness issues have been further intensified following the loss of one helicopter in 2006, leaving the remaining 14 helicopters no longer able to support the original four-base operating system.<sup>42</sup> Consequently, the Cormorants stationed at the Trenton JRCC were reallocated to the three other air bases (Comox, BC; Greenwood, NS; and Gander, NL) to support SAR services there and assigned Griffon helicopters to the Trenton location on a temporary basis.<sup>43</sup> The Griffon is an inferior helicopter compared to the Cormorant as it has a shorter range, smaller lift capacity, lacks a de-icing system, and was never designed

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<sup>39</sup> Colin Kenny, "Canada's search-and-rescue dodge."

<sup>40</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada": 16-17.

<sup>41</sup> Ibid:18.

<sup>42</sup> Ibid.

<sup>43</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 16.

for SAR purposes.<sup>44</sup> These limitations are particularly concerning for Arctic operations as the Trenton SRR is the largest in size of the SRRs at more than 10 million kilometres squared, which includes the majority of the Canadian Arctic.<sup>45</sup> Therefore, on account of the Griffon's shorter range and lack of de-icing system, simply reaching and operating in remote northern locations would be difficult if not unfeasible, resulting in a lower capacity to provide SAR services to remote communities.<sup>46</sup> Although the Griffon has been temporarily reassigned as a SAR helicopter for the Trenton SRR, there has been no effort to find a permanent or more suitable rotary-wing replacement.

### *SAR Information System*

Information is vital to SAR operations and aids in making informed decisions concerning a particular SAR mission as well as decisions pertaining to current and future SAR needs. Currently, the SAR Mission Management System is the information system used at the operational level by both CF and CCG staff to coordinate and record all operational information of a mission from the notification call to the end of the operation.<sup>47</sup> However, this system does not support operational requirements and is on the verge of un-usability. This old system possesses inferior map quality, has no automatic date and time capture, and lacks consistency in how data is recorded; reducing the quality of the data collected.<sup>48</sup> Failure of this system in 2009 destabilized the software and has caused concerns that the system will soon become completely inoperable, severely impacting SAR mission management.<sup>49</sup> This system is expected to be

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<sup>44</sup> Colin Kenny, "Canada's search-and-rescue dodge."

<sup>45</sup> Department of National Defence, "Trenton Search and Rescue Region"

<sup>46</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 16.

<sup>47</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 18.

<sup>48</sup> Ibid: 19.

<sup>49</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada": 19.

replaced by 2015-16, but there are no arrangements in motion to address the disparity in time between now and the implementation of a new system.<sup>50</sup>

### *Federal SAR Governance*

The Canadian SAR system lacks a national SAR policy framework. As a shared responsibility, SAR is delivered by both governments and volunteers. As such, in the interest of efficient and effective service, it is essential that there be a framework to govern and coordinate SAR activities. Without one, each SAR authority will set and direct its own SAR priorities, service requirements, standards, and coordination procedures.<sup>51</sup> This can result not only in disjointed and varying SAR services and standards across the country, but can also affect data quality. Without a standardised accounting method, the value, reliability, and comparability of data will vary; impacting the evaluations and decisions made concerning SAR activities, performances, and trends.<sup>52</sup> It should be noted that the NSS, despite several attempts, has yet to fully implement its 1986 mandate which includes the development of a national SAR policy and governance framework, the establishment of standards for SAR services, and the creation of a program performance measurement framework.<sup>53</sup> Although SAR activities would benefit and improve with the addition of an over-arching national SAR policy, it is important to note that each member's adherence would be self-regulated and may require the creation or appointment of a single organisation responsible for overseeing SAR coordination and policy obedience to help achieve seamless collaboration, coordination and interoperability.<sup>54</sup>

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<sup>50</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 19.

<sup>51</sup> Ibid: 24.

<sup>52</sup> Department of National Defence, "Quadrennial Search and Rescue Review": V

<sup>53</sup> Martin Shadwick, "Reflections on Search and Rescue" *Canadian Military Journal* 13, no.4 (2013):73-74.

<sup>54</sup> Colin Kenny, "Canada's search-and-rescue dodge."

### ***Section Summary***

Canada's SAR system was organized based upon already existing infrastructure, resources, and personnel. Although this system has served Canadians well in the past, it "is struggling to maintain itself and is not prepared to withstand any significant change".<sup>55</sup> It is currently labouring to provide the necessary personnel, training, equipment, information, and coordination to satisfy present-day operational demands. These challenges directly affect the success of all SAR operations within the country and jeopardises its ability to deal with emerging SAR needs such as those anticipated to occur in the Arctic. Having understood the structure, operation, and general stress points presently affecting SAR in Canada, the following section of the paper will be devoted specifically to exploring the Arctic SAR environment, highlighting the unique challenges it represents for both present-day as well as future SAR services.

### **SAR in the Arctic**

Canada, as previously discussed, is characterised as having one of the most difficult environments in the world within which to conduct SAR operations. This is not only due to the scale and enormity of its SAR area of responsibility, but also due to the challenges associated with its vast and varying terrain, extreme weather conditions, areas consisting of sparse and isolated populations, as well as providing service to regions with limited infrastructure and resources. Interestingly, these challenges listed above also describe the SAR environment found specifically in the Canadian Arctic. Due to this reality, it is essential that a proper definition of Canada's 'Arctic Region' now be established so as to better support the exploration of its challenges.

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<sup>55</sup> Stephen Reid, "Improving Search and Rescue (SAR) in Canada": 19-20.

### ***Defining the Arctic Region***

The 60<sup>th</sup> parallel is generally regarded as the Arctic boundary within Canada; however this boundary is subject to debate as it excludes some regions of the Canadian Arctic and Subarctic lands such as portions of Northern Quebec (Nunavik) and Labrador, as well as marine areas of the Arctic Archipelago including Hudson's Bay.<sup>56</sup> Although north of the 60<sup>th</sup> parallel encompasses much of the Arctic Region, for the purposes of this paper, the Arctic will also include Labrador, the Nunavik region of northern Quebec, and the whole Canadian Arctic Archipelago. Therefore, the Arctic Region will consist of the Yukon, the Northwest Territories, Nunavut, Nunavik northern Quebec, Labrador, and all of the Arctic Archipelago, including Ungava Bay, Hudson's Bay and James Bay. Together, this Arctic Region "represent[s] approximately 40 percent of the country's landmass, and almost two-thirds of its coastline".<sup>57</sup> With the Arctic now clearly defined, the issues and the challenges facing Arctic SAR can now be examined.

### ***Challenges to Conducting SAR in the Arctic***

Geographically, the Arctic consists of both Arctic and Subarctic land which can be divided into four physiographic sub-regions: the Arctic Coastal Plains, the Arctic lowlands, the High Arctic Inuitian Mountain Complex, and the Canadian Shield in Nunavut, northern Quebec, and Labrador.<sup>58</sup> These subsections of landscape vary from sticklike wooded areas of spruce trees and vast scattered wetlands; to areas with low lying vegetation and dwarf shrubs; to

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<sup>56</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy for Canada" Master's Thesis, Dalhousie University (2011): 18, retrieved from [http://dalspace.library.dal.ca/bitstream/handle/10222/14285/Russell\\_2011\\_MMM.pdf?sequence=1](http://dalspace.library.dal.ca/bitstream/handle/10222/14285/Russell_2011_MMM.pdf?sequence=1).

<sup>57</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept" *Canadian Military Journal* 11, no. 2 (2011): 22.

<sup>58</sup> "Physiographic Regions," The Canadian Encyclopedia, accessed September 18, 2014. <http://www.thecanadianencyclopedia.ca/en/article/physiographic-regions>.

treeless tundra and polar desserts; and finally to rocky and mountainous terrain.<sup>59</sup> Essentially, the Arctic is a large area consisting of a variety of difficult geographic environments to which SAR personnel must adapt and overcome for the successful conduct of life-saving operations.

Although its geography alone represents a significantly vast and challenging landscape within which to perform SAR missions, its topography also serves as a foundation to enhance and strengthen other obstacles in the provision of Arctic SAR services. Namely, these obstacles include the Arctic's extreme weather conditions, small and isolated populations, lack of infrastructure, inadequate situational awareness, and climate change.

#### *Extreme Weather Conditions*

Canada possesses an Arctic climate which is both severe and very unforgiving. Generally, its lakes and rivers are usually ice-free from June to October in its more southern Arctic regions while the northern Arctic normally remains ice-covered for the majority of the year save for the two months of July and August.<sup>60</sup> During the winter months, the Arctic becomes a region characterized by total darkness and remains this way for approximately half of the year.<sup>61</sup> Throughout this time, average temperatures range from -20 to -50 degrees centigrade while "[f]requent storms and blizzards often create whiteout conditions that limit mobility. Needless to say this constitutes a major factor for military operations".<sup>62</sup> The summer months, along with those leading into fall, can for the most part be described as having frequent fog and icing conditions; both of which would not only be hazardous and problematic when conducting SAR, but when traveling and navigating generally.<sup>63</sup> All things considered, there are many

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<sup>59</sup> "The Far North: Arctic and Taiga," The Canadian Atlas Online, *Canadian Geographic*. Accessed September 19, 2014. <http://www.canadiangeographic.ca/atlas/themes.aspx?id=artic>.

<sup>60</sup> "Physiographic Regions," The Canadian Encyclopedia.

<sup>61</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships: The Urgent Need for Search and Rescue". *Frontline Security*, 7(3): 22.

<sup>62</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept": 22.

<sup>63</sup> *Ibid.*

different austere environmental situations SAR workers operating in the Arctic can expect to experience and for which they must be prepared. These climatic situations include but are not limited to operating in frigid temperatures, freezing ice water, fog, limited to no daylight, high winds, whiteout and icing conditions, persistent Arctic cyclones, high waves, and unpredictable ice movements.<sup>64</sup> Crews can also expect to experience limitations in their equipment's operation due to weather conditions such as mechanism slips caused by freezing and icing conditions, the loss of the ability to free fall or use fast decent systems due to ice, navigational instrument inaccuracies due to geomagnetic storms and ionospheric disturbances, as well as the need to ensure life rafts are capable of operating in both ice and open water.<sup>65</sup>

The role that weather plays within emergency situations can range from its cause, to being the greatest obstacle crews conducting SAR operations must work to overcome. However, when it comes to the Arctic, its climate can also be the deadliest factor to be conquered; meaning despite surviving an incident in the high north, the likelihood of survival decreases the longer victims are exposed to the Arctic's harsh weather conditions. "Death from exposure is the biggest risk factor faced by incident victims" where time is of vital importance as continued exposure increases the chances for loss of life.<sup>66</sup> This can also be true for SAR personnel who are providing lifesaving services in some of the country's harshest environments. This can be evidenced through an examination of past SAR missions in the Arctic such as the crash off of the CF station of Alert (Nunavut), and the rescue mission near Igloolik, Nunavut. The first mission is an example of how severe Arctic weather can stymie rescue attempts and prove to be life-threatening to any survivors. Following the crash of a C-130 *Hercules* just 30 kilometres short of

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<sup>64</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 30.

<sup>65</sup> Ibid; Anna Jensen and Jean-Paul Sicard, "Challenges for Positioning and Navigation in the Arctic," *Coordinates*, October, 2010. <http://mycoordinates.org/challenges-for-positioning-and-navigation-in-the-arctic/>.

<sup>66</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 22; William Russell, "A Proposed Arctic Search and Rescue Strategy": 75.

the runway at Alert, severe weather conditions obstructed Arctic SAR teams' attempts to reach the site from their station just kilometres away.<sup>67</sup> The crash killed four of the 18 passengers and crew immediately, with a fifth later dying to exposure due to high winds, whiteout conditions, and chill temperatures reaching minus 70° centigrade.<sup>68</sup> The second rescue mission involves difficult weather conditions leading to the death of a SAR technician. Following the loss of communication with two stranded Inuit hunters, three SAR technicians elected to parachute down into two to three metre high waves in ice-covered seas to provide supplies and rescue services while awaiting the arrival of a Cormorant helicopter. Unfortunately, environmental conditions proved to be fatal for Sgt. Janick Gilbert who lost his life during this mission.<sup>69</sup> It should be noted that even in calm environmental conditions, low Arctic temperatures alone can place lives at risk with prolonged exposure.

### *Sparse and Isolated Populations*

Irrespective of the fact that the Arctic constitutes 40 percent of the nation's landmass, the Canadian north is very thinly populated with just over 100,000 residents; most of whom are located within the country's three territories: the Yukon, the Northwest Territories, and Nunavut.<sup>70</sup> Resulting from the Arctic's sheer size, difficult environment, and low population density, northern residents have tended to congregate in small, isolated communities generally located along remote Arctic coastal regions.<sup>71</sup> These communities, due to size and activity, produce a low number of SAR incidents per year accounting for less than one percent of the

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<sup>67</sup> Ron Wallace, "Emerging Canadian Priorities and capabilities for Arctic search and rescue." *Canadian Defence and Foreign Affairs Institute*, 2012: 2.

<sup>68</sup> Ibid.

<sup>69</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 22.

<sup>70</sup> Ron Wallace, "Emerging Canadian Priorities":5

<sup>71</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 75.

country's SAR calls.<sup>72</sup> In contrast with the Arctic region, “[t]he vast majority of Canada’s population...live well south of the 60<sup>th</sup> parallel, indeed most reside close to the Canada-USA border”.<sup>73</sup> Owing to the larger populations and greater activity of the southern communities, these regions represent the majority of SAR operations. Because the JRCCs and SAR resources were strategically positioned within close proximity to concentrated incident areas, all primary SAR units and resources can be found in the country’s southern portion where most SAR activities occur.<sup>74</sup> Unfortunately for Arctic communities, due to their low volume in SAR incidents, there are no primary Arctic SAR assets located north of 60° latitude. While marine SAR vessels can be found within the Arctic region at different times throughout the year, these vessels are considered secondary SAR assets as they are primarily there to conduct other CCG programs such as icebreaking, scientific research, and supporting resupply shipments to Arctic communities.<sup>75</sup>

Although the positioning of SAR resources near high incident locations would provide an efficient and effective posture to respond to most SAR emergencies, it creates an obstacle to providing SAR services in the Arctic. The distances needed to travel from southern operating bases to provide SAR services in the North is a very significant challenge for SAR crews. While centralisation of SAR assets near accident prone locations is understandable, it solicits the question of whether or not the Canadian Arctic is adequately served by locating vital SAR resources in the south, thousands of kilometres from a potential SAR incident in the Arctic.<sup>76</sup> The remoteness of Arctic populations from where rescue services are located presents both “staging and access problems in terms of timelines of a response and the physical arrival of

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<sup>72</sup> Michelle Zilio, "Someday 'your number is going to come up': Lagging Arctic SAR risks much: experts," *iPolitics*, last modified January 3, 2013. <http://www.ipolitics.ca/2013/01/03/someday-your-number-is-going-to-come-up-lagging-arctic-sar-risks-much-experts/>.

<sup>73</sup> Ron Wallace, "Emerging Canadian Priorities":5.

<sup>74</sup> Department of National Defence, "Search and Rescue Canada"

<sup>75</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 70.

<sup>76</sup> Ron Wallace, "Emerging Canadian Priorities":4.

personnel and equipment”.<sup>77</sup> In the absence of a marine vessel in proximity to an incident in the Arctic, the quickest SAR assets that can reach the scene are FWSAR aircraft, followed by the Cormorant helicopter. However, according to retired Colonel Peter Leblanc, former commander of the Joint Task Force (North), SAR aircraft can take roughly anywhere from six to ten hours to travel from southern operating airbases in Comox (British Columbia), Winnipeg (Manitoba), Trenton (Ontario), and Greenwood (Nova Scotia), before physically arriving over the target to drop either SAR technicians or equipment.<sup>78</sup> Due to the long distances needed to travel to arrive in northern locations to perform SAR missions, a secondary crew may become necessary to provide much needed relief to initial respondents and complete the mission.<sup>79</sup> This is particularly true for SAR operations requiring the use of helicopters as rotary-wing aircrafts are slower, take longer to arrive than their fixed-wing counterparts, have a smaller carrying capacity, and require on route refueling.<sup>80</sup>

In summary, despite encompassing a large part of the country, the Canadian Arctic is home to but a very small, isolated population that is responsible for only a minor number of SAR calls per year. As a result, vital SAR resources were stationed near critical incident locations in the south, requiring SAR crews to travel great distances in order to reach remote areas to provide lifesaving SAR services. The long distances needed to travel to incident locations in the Arctic present several challenges to SAR such as: the inability to arrive on scene within an acceptable timeframe, increased stress and fatigue in SAR personnel due to longer missions, requiring the transport of secondary crews to provide relief, and limited fuel capacities requiring on route or mid-mission refueling. The main concern here is the time it takes for crews to arrive on location,

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<sup>77</sup> Judson, Brad. "Trends in Canadian Arctic Shipping Traffic—Myths and Rumours." In *Proceedings of the 20th International Offshore (Ocean) and Polar Engineering Conference & Exhibition*. 2010.

<sup>78</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 21-22.

<sup>79</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 70.

<sup>80</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 22.

as death from exposure to the extreme elements of the Arctic is the greatest risk to victims. As a result, SAR operations in the north normally involve an increase in loss of life; thus underlining the dangers of having distant Arctic SAR resources.<sup>81</sup> In a word, SAR resources are located at an unsafe distance from the small isolated Arctic communities.

### *Lack of Infrastructure*

The Arctic currently has a very limited infrastructure which has proven to be a significant and growing challenge in the delivery of Arctic SAR services. Under existing Arctic conditions, “any attempt to mount even a small scale operation would be difficult, since the region is lacking in even the most basic infrastructure” such as road networks, airfields, staging and supply bases, and medical facilities.<sup>82</sup> In addition to these basic foundations, there is also minimal support infrastructure in place for Arctic SAR operations within the region including refueling depots, repair facilities, sufficient communication capabilities, and dispersed medical facility locations.<sup>83</sup> The absence of such infrastructure in the Arctic means SAR personnel must find other arrangements so as to continue to provide the needed SAR services- even if it means utilising the closest airfields, bases, refueling depots, repair facilities and medical services in neighbouring provinces. This is the current reality for an overwhelming majority of the Arctic as the closest hospital, for instance, is oftentimes located in Edmonton unless SAR crews wish to rely on the limited resources available from small Arctic medical centres.<sup>84</sup> Although the positioning of important support services throughout the Arctic would be ideal, many of the Arctic’s communities are simply too small to support such an endeavor. As it is, most northern communities, according to the 2011 *Arctic Communications Infrastructure Assessment*, are

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<sup>81</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 75.

<sup>82</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept": 26.

<sup>83</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 76.

<sup>84</sup> Michelle Zilio, "Someday ‘your number is going to come up’”.

unable to supply the necessary communication service, speed, or capacity rescue personnel require when responding to an emergency situation.<sup>85</sup> Basic communication services are not necessarily available across the north; even its urban center networks can be easily overloaded by SAR personnel resulting in disruptions in communications similar to what was experienced during the CF's 2009 *Operation Nanook*.<sup>86</sup>

Although both Canada's *Northern Strategy* and *Arctic Foreign Policy* recommend investing in critical Arctic infrastructure and despite the developments which have occurred, the Arctic Council's Arctic Marine Shipping Assessment Report found that "recent growth in Arctic marine tourism is outpacing infrastructure investment, development and support through the region".<sup>87</sup> The report also notes that in the case of a mass rescue operation involving either a passenger aircraft or cruise ship, the infrastructure needed to provide all rescued individuals with food, shelter and medical services is lacking throughout most of the Arctic. Simply put, the Arctic does not possess the crucial infrastructure necessary to support emergency response and recovery operations.

### *Situational Awareness*

Situational awareness at the operational level, according to Major Tony Balasevicius, "is described as Sense capabilities, and it encapsulates the components of Surveillance and Reconnaissance... measured in terms of recognizing possible threats, and having the ability to analyze a given situation in order to carry out appropriate action".<sup>88</sup> In the absence of having CF SAR units stationed in the Arctic, the need for good, reliable situational awareness capabilities

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<sup>85</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 25.

<sup>86</sup> Imaituk Inc. "A Matter of Survival: Arctic Communications Infrastructure in the 21st Century," The Arctic Communications Infrastructure Assessment Report, prepared for the Northern *Communications & Information Systems Working Group*: 105. <http://www.aciareport.ca/>: 105.

<sup>87</sup> Joseph Spears, "Adding an 'I' to Arctic SAR: Impact of the international Arctic SAR Agreement." *FrontLine Defence*, 8(4) 2011.

<sup>88</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept": 27.

becomes even greater. Part of this awareness can be achieved via space-based sensors like the Medium Earth Orbit SAR and Low Earth Orbit SAR satellite projects capable of providing real time information over all of the Arctic's vast area.<sup>89</sup> However this does not compensate for some of the information and awareness gained by simply having crews in the Arctic since day to day operation and training would occur in the Arctic environment fostering greater familiarization and experience within the region.

SAR personnel can also gain situational awareness through the use of nautical charts. These charts provide essential information on water depth, navigational hazards, as well as other geographical features and characteristics which are crucial for safe maritime travel. For an area to be considered surveyed to adequate or modern standards, the data must be collected with post-1970 technologies such as single beam sonar for adequate hydrographic charts and multi-beam sonar for modern hydrographic charts.<sup>90</sup> Any map using data that does not meet this threshold is considered unreliable as there is an increased probability of undetected hazards and inexact data positioning. According to the Canadian Hydrographic Service, "large areas of Canadian Arctic waters, including many of the main traffic corridors, have either non-existent or inadequate hydrography data coverage" with only roughly one percent achieving modern standards.<sup>91</sup> This is a dangerous navigational environment not only for local northern and commercial vessels but for vessels conducting SAR activities. This became very apparent following the *Clipper Adventurer* grounding as the reef, although known, was not marked on any official hydrographic maps.<sup>92</sup> Despite knowledge of the reef, exact information as to its size and depth were not available, as a

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<sup>89</sup> Martin Shadwick, "Reflections on Search and Rescue": 74.

<sup>90</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic," In *2014 Fall Report of the Commissioner of the Environment and Sustainable Development*, Ottawa: Office of the Auditor General of Canada, 2014: 6.

<sup>91</sup> Ibid.

<sup>92</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 20-21.

result, the Canadian Hydrographic Service was brought in to survey the area ensuring rescue vessel safety and secure passage to local ports.<sup>93</sup>

### *Climate Change*

The Arctic is in a state of change which is understood as leading to the eventual melting of the North's ice cover. While much debate continues to exist over whether or not these variations in the North's environment represent normal oscillations in climate or are indeed the result of an increase in greenhouse gasses in the atmosphere (global warming); these changes have profound impacts on not only the Arctic environment, but on Arctic communities and their way of living.<sup>94</sup> Over the past decade, the ice in the Arctic has been receding at an accelerated and unprecedented rate.<sup>95</sup> In 2007, summer Arctic sea ice reached its lowest level recorded and opened up the historically ice clogged Northwest Passage for shipping.<sup>96</sup> According to the National Snow and Ice Data Centre, since 1979, winter Arctic ice has decreased three to four percent with a reported record low in 2012 of 3.41 million square kilometres of Arctic sea coverage.<sup>97</sup> Consistent with the overall trend of decreasing ice coverage, the Arctic Council's Arctic Climate Impact Assessment conducted in 2004 found that annual Arctic temperatures have been increasing at twice the rate when compared to the global average over the last 50 years.<sup>98</sup> This assessment went on to project a further increase of four to seven degrees centigrade in Arctic temperatures over the next century.<sup>99</sup> It is important to distinguish that although data

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<sup>93</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic": 8.

<sup>94</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 27.

<sup>95</sup> Rob Huebert, "Canadian Arctic Sovereignty and Security in a Transforming Circumpolar World," *Foreign Policy for Canada's Tomorrow*, Canadian International Council, (2009):3. <http://opencanada.org/wpcontent/uploads/2011/05/Canadian-Arctic-Sovereignty-and-Security-Rob-Huebert1.pdf>.

<sup>96</sup> Anneta Lytvynenko, "Arctic Sovereignty Policy Review," Prepared for the Ad Hoc Committee of the Deputy Ministers on the Arctic (2011):3. <http://www4.carleton.ca/cifp/app/serve.php/1355.pdf>.

<sup>97</sup> "Arctic Sea Ice News and Analysis," *National Snow and Ice Data Center (NSIDC)*, last modified December 3, 2013, accessed December 6, 2013. <http://nsdic.org/arcticseaicenews>.

<sup>98</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 29.

<sup>99</sup> *Ibid.*

shows a general decrease in Arctic ice coverage over the past 50 years, the Canadian Arctic experiences year to year variability in coverage.<sup>100</sup>

The environmental changes occurring in the Arctic stand to pose significant challenges to not only Arctic SAR, but SAR in general as the system is currently fighting to meet current SAR requirements and does not possess the capacity to withstand any significant changes. Due to the nature and speed at which the Arctic environment is changing, northern climate conditions are expected to experience a high rate of variability.<sup>101</sup> This will not only influence the Arctic's already demanding landscape, but its weather predictability making it increasingly difficult for southern based SAR units to maintain proper situational awareness and preparedness to successfully complete northern operations. However climate change is not only creating a more difficult environment in which to perform response and recovery operations, but one that is also more dangerous to its inhabitants. The increasing unpredictability of storms, thawing geography, and progressively thinning ice are also increasing the probability of a SAR event, particularly as traditional Inuit fishing and hunting areas become increasingly dangerous and inaccessible.

Perhaps one of the greatest emerging challenges for Arctic SAR is that as the north continues to become increasingly accessible for longer periods of time, there is the potential for greater human activity in the region through resource exploration and extraction (such as oil, gas, mineral, fishing), new shipping routes, increased air and marine transport, and tourism opportunities. However, due to the elimination of first year ice from parts of the Arctic Archipelago such as the Northwest Passage, marine travel will become increasingly hazardous at least in the short term.<sup>102</sup> Through the absence of first year ice, dense multi-year ice previously preventing travel through the Northwest Passage can now flow freely posing a significant hazard

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<sup>100</sup> Brad Judson, "Trends in Canadian Arctic Shipping Traffic—Myths and Rumours."

<sup>101</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 28.

<sup>102</sup> Ibid: 29.

to safe navigation, furthermore “even in a generally ice free Arctic, lighter ice conditions would make the regions even more susceptible to winds and ocean currents creating locally hazardous congested areas”.<sup>103</sup> Consequently, as Arctic waters continue to open and allow for greater and longer navigability in this icy, remote, and hazardous region, the need for SAR capabilities will also increase. Unfortunately, the current SAR system, as discussed earlier, may not be able to support such an increased need in Arctic SAR services.

### ***Future Activity in the Arctic***

Historically, the Arctic housed very little activity as extreme weather and inaccessibility due to extensive ice-cover limited movement and failed to garner much interest in the region. For the most part, with only few exceptions, all Arctic activity originated from the small number of people who resided in the north. However, this is becoming no longer the case as climate change has led to an increase in general accessibility to the Arctic region. While ease of entry may support the growth of activity, its development is reliant upon interest in the region; which, in the case of the Arctic, is rooted predominantly in commercial and economic motivations. In particular, the incremental increase in Arctic activity has occurred out of resource exploration and development, the search for shorter shipping routes, community resupply, increased commercial and pleasure aviation, and tourism opportunities. It is important that within this complex and changing Arctic environment, the Canadian SAR system be positioned so as to maintain appropriate responses to current as well as future Arctic SAR needs as these developments bring more than just economic and development opportunities, but risks as well.

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<sup>103</sup> Ibid.

*Resource Exploration and Development*

One of the biggest drivers of interest in the Arctic is the possible access to and exploitation of Arctic resources. Due to the region's history of inaccessibility, the Arctic now represents one of the world's last remaining untapped stores of resource; and thanks to contemporary developments increasing accessibility, technological advancements, and rising commodity prices, the exploitation of Arctic resources are becoming more economically viable. As a result, one of the main drivers of interest in the Arctic is the discovery and exploitation of hydrocarbons. It is estimated that roughly 25 percent of the remaining undiscovered oil and gas reserves reside in the Arctic.<sup>104</sup> Additionally, a study conducted by the United States Geological Survey further concluded that the Arctic contains approximately 13 percent of the global supply of oil and 30 percent of the global supply of natural gas.<sup>105</sup> Furthermore, it has been discovered that this polar region also possesses another form of hydrocarbon known as gas hydrates, which are basically a solidified form of natural gas found deep in the cold Arctic waters.<sup>106</sup> While not much is known concerning the quantity of gas hydrates in the Arctic, it has the potential to become an important energy source for the future.

Despite the numerous benefits and opportunities the exploitation of hydrocarbons would bring to Arctic communities, such an increase in activity would also grow the Arctic's demand for SAR services. The surge in human, maritime, and aeronautical traffic alone would be enough to constitute an increase in demand for SAR services, but northern extraction operations further swell the need for this service. Offshore oil and gas exploration is known to be a dangerous endeavour and has resulted in several SAR incidents over the years, like the 1982 Ocean Ranger

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<sup>104</sup> Rob Huebert, "Canadian Arctic Sovereignty and Security": 12-13.

<sup>105</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept": 23.

<sup>106</sup> Rob Huebert, "Canadian Arctic Sovereignty and Security": 12-13.

tragedy and the 2009 crash of a Sikorsky S-92 off the coast of Newfoundland.<sup>107</sup> Its hazardous nature will only be intensified by the Arctic's dangerous and complex environment, increasing the risk of requiring emergency rescue services. However, hydrocarbons are not the only abundant resource attracting interest and development in the Arctic; there are also large deposits of minerals such as diamonds, nickel, and iron ore, as well as Arctic fishing which have been attracting attention as well.

The Arctic possesses significant stores of both minerals and diamonds with several ventures currently in operation as well as a number of others in development. Presently, Canada has several diamond stores, like the Ekati, Diavik, and Snap Lake diamond mines, which have been in operation for roughly a decade.<sup>108</sup> The diamonds extracted from these mines, according to *Canadian Geographic*, account for nearly 20 percent of the market's new diamonds, a number which is expected to grow.<sup>109</sup> In addition to diamonds, the Arctic also has many other profitable stores such as its nickel mines which have been in operation for several years, a recently opened iron ore facility which began making shipments in 2013, as well as many other mineral and earth metal mining projects.<sup>110</sup> Environment Canada estimates "that new mining projects in the eastern Arctic could result in about 300 new voyages per year by 2020, nearly doubling current traffic levels."<sup>111</sup> The opening of each new mining project involves a significant activity increase for that region; the May River iron ore mine, for example, produces approximately 141 shipping transits through the Hudson Strait annually with around 104 resupply and crew replacement flights.<sup>112</sup> These flights and transits via ice-reinforced bulk carriers can prove to be perilous due

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<sup>107</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 41.

<sup>108</sup> Ibid.

<sup>109</sup> Tony Balasevicius, "Towards a Canadian Forces Arctic Operating Concept": 23.

<sup>110</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 41-42.

<sup>111</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic": 1.

<sup>112</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 42.

to unpredictable severe weather, shifting ice flows, and inadequately charted waters. In the same way, these dangers are also relevant to Canada's growing Arctic fishing industry.

Fishing in the Arctic region is a growing industry as vessels are increasingly able to operate in more northerly areas and over longer timeframes.<sup>113</sup> With increasing temperatures, commercial fish stocks are anticipated to improve as well as result in the eventual habitat expansion for other fish species, adding to the Arctic's offshore Northern Shrimp, Arctic Char and Greenland Turbot industries.<sup>114</sup> These developments can have significant consequences for SAR services as coverage may need seasonal enhancements similar to what is already in place with other high risk industry activities, such as Nova Scotia's lobster fishery. The nature of the offshore fishing business is what categorises it as a high risk industry as a large portion of the SAR calls involving fishing vessels are medical evacuations of crew members.<sup>115</sup> Additionally, the Arctic's remoteness and difficult hydrographic and climatic conditions make offshore fishery operations even riskier than its more southern counterparts.

### *Arctic Shipping*

Next to resource development, the Northwest Passage (NWP) becoming a major shipping channel is the biggest and most anticipated consequence of the Arctic's changing climate. The NWP began as a hypothetical trade route that would cut across the top of North America connecting the Atlantic and Pacific Oceans making travel between Europe and Asia not only shorter, but seemingly cheaper. Europeans began searching for this pathway about 500 years ago with many explorers dying or never returning like in the infamous Franklin expedition. However, through the continued decline of ice in the Canadian Arctic Archipelago, the navigation of the NWP's numerous waterways is becoming a reality for longer periods of time. International

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<sup>113</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic": 1.

<sup>114</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 44.

<sup>115</sup> Ibid.

interest in this passage, notwithstanding its international legal status, is understandable as a voyage through Canadian Arctic waters can potentially cut over 7,000 kilometers off traditional shipping routes between several European and Asian ports as well as the east and west coast of North America.<sup>116</sup> However the idea of the NWP becoming a heavily traveled shipping route comparable to the Panama Canal appears to be rooted in fiction as safety issues and uncertain monetary advantages have diminished company interest.

According to the 2009 Arctic Marine Shipping Assessment, the complexity of the Archipelago, its shallow channel locations, lack of adequate charts and navigational aids, unpredictable ice conditions, and high insurance costs are cited as major deterrents to the extensive utilisation and travel of the NWP.<sup>117</sup> In fact, in light of these obstacles, the NWP is not expected to become a viable and scheduled route across the Arctic for commercial ships until closer to 2020 when ice conditions are expected to become more predictable.<sup>118</sup> These findings are echoed and further explained by Stephen Carmel who is the senior vice president of Maersk Line, the world's largest shipping company. Carmel argues that the Arctic's challenging and unpredictable environment renders travel and shipping via the NWP impractical. Specifically, hazardous ice, reduced visibility due to weather, and shallow waterways would dictate slower travel speeds; eliminating the time economised by the shorter route.<sup>119</sup> Additional to lost fuel economy, insurance premiums for travel in the Arctic would also be high due to the regions unpredictability, hazardous navigational environment, and slow SAR response times.<sup>120</sup> Carmel also pointed out that Russia's Northern Sea Route is not only shorter for many of the Asian-European ports, but less hazardous and potentially more commercially viable than the NWP due

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<sup>116</sup> Ron Wallace, "Emerging Canadian Priorities":6.

<sup>117</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic": 2.

<sup>118</sup> Ibid.

<sup>119</sup> Standing Senate Committee on National Security and Defence, "Sovereignty & Security in Canada's Arctic," Interim Report (March 2011). <<http://www.parl.gc.ca/Content/SEN/Committee/403/defe/rep/rep07mar11-e.pdf>>: 37.

<sup>120</sup> Ibid: 38.

to its deep and uncomplicated channel which will experience ice elimination prior to the NWP.<sup>121</sup> Despite the merit of these accounts, Carmel's strongest statement was that Maersk Line had no interest in operating in the Arctic as well as many of the regular international shipping companies. This is supported by a 2008 survey which found that of 34 companies representing 62 percent of global ship-based transport, only 11 were interested in using the NWP as an international shipping route.<sup>122</sup> Of these interested companies, nearly all were North American based organisations already involved in Arctic operations. Although it appears increasing shipping activity in the Arctic will not be driven by the international bulk shipping community, there will, nevertheless, be growths in Canadian Arctic shipping activity.

Ship-based transportation constitutes one of the primary means of moving goods to, from, and through the Canadian Arctic and as a result, is crucial to the sustainability of the region.<sup>123</sup> According to the CCG, 2013 saw about 350 Arctic marine voyages and despite being low compared to southern Canadian waters, the number and frequency of these trips have been increasing over the last 20 years.<sup>124</sup> This upward trend in Arctic shipping is expected to continue in large part due to resource development and extraction operations (as seen above with oil, mining and Arctic fishing) and Arctic destination shipping such as community resupply.

### *Community Resupply*

The Arctic is inhabited by over 100,000 people accounting for less than 0.3 percent of the Canadian population while encompassing over roughly 40 percent of the country.<sup>125</sup> Although all the Arctic communities combined represent but a very small segment of the population, they also constitute one of the fastest growing demographics having expanded just over 20 percent within

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<sup>121</sup> Ibid.

<sup>122</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 34.

<sup>123</sup> Auditor General of Canada, "Marine Navigation in the Canadian Arctic": 1.

<sup>124</sup> Ibid.

<sup>125</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 14.

the last five years.<sup>126</sup> However, the regions remoteness and lack of substantive on-land transport infrastructure means the growing resupply needs of Arctic communities will primarily take the form of either air or marine deliveries. Furthering this tendency is the fact that increasing Arctic temperatures are causing changes to permafrost which negatively impacts northern land transportation safety and capacity, fostering an even greater dependence other means of delivery for resupply.<sup>127</sup> While rising temperatures are expected to increasingly limit ground transportation, it is also expected to expand ease of access for vessels. Projections show that by mid-century, marine accessibility to northern communities should have increased by 30 percent, potentially offsetting the reduction of inland movement of goods.<sup>128</sup>

#### *Commercial and Pleasure Aviation*

Growing northern communities coupled with technological advancements have also encouraged higher aviation traffic in the High North. With few inland transportation networks and the isolated and remote nature of Arctic communities, daily transportation needs are commonly fulfilled by aircraft, providing a critical connection between communities as well as access to resources.<sup>129</sup> In addition to this local and pleasure air traffic, passenger and cargo flights are now transiting the Canadian Arctic at increasing rates. Currently, overflights by commercial aircraft number in the region of 115,000.<sup>130</sup> As a result, the Arctic is in a unique situation “in that, at any one time, we have more people flying over the Canadian Arctic than we have people residing in the region.”<sup>131</sup> This is increasingly becoming the case as more polar routes are being developed and implemented to provide more effective travel both within and

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<sup>126</sup> Government of Canada, “Population by Year, by Province and Territory (% Change).” *Statistics Canada*, CANSIM, table number 051-0001, last modified Sept. 26, 2014. <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm>.

<sup>127</sup> William Russell, “A Proposed Arctic Search and Rescue Strategy”: 38.

<sup>128</sup> *Ibid.*: 39.

<sup>129</sup> Tony Balasevicius, “Towards a Canadian Forces Arctic Operating Concept”: 22.

<sup>130</sup> Ron Wallace, “Emerging Canadian Priorities”:6.

<sup>131</sup> Joseph Spears. “Adding an ‘I’ to Arctic SAR”.

between continents. The use of polar routes by passenger aircraft introduces the possibility of the Arctic not only witnessing an increased rate of aircraft related SAR calls, but the possibility of experiencing a major air disaster. However, contrary to popular belief, there is no evidence to suggest that this increase in aerial activity will necessarily lead to a significantly greater incident rate. In fact, the accident rate for commercial overflights in the Arctic is 1.02 per million departures with the highest risks of fatality occurring during aircraft takeoff and landing.<sup>132</sup>

While the likelihood of an aeronautical incident remains relatively low despite rising activity, higher air traffic is a factor in the Arctic's changing SAR needs that must not be disregarded as it is not without its dangers. The Arctic region is notorious for navigational unreliability due to magnetic interference and, despite great improvements in air navigation technologies, it remains an added challenge to northern travel.<sup>133</sup> Similarly, even with a minimal probability of a major air disaster occurring in the Arctic, the possibility exists nonetheless and Canada's SAR system needs to have a plan in place to respond. The logistical challenges of mounting a mass rescue in the Arctic are extensive and range from limited SAR resources to inadequate infrastructure to accommodate and care for those rescued.<sup>134</sup> It is for this reason a contingency plan should be created to not only direct and guide SAR efforts in the case of a major air disaster, but for a major maritime disaster as well seeing as Arctic cruise ship tourism is also on the rise.

### *Arctic Tourism*

The continued increase in Arctic accessibility has allowed the creation of a thriving Arctic tourism industry. Beginning in the 1980s, Arctic cruise tourism has steadily increased each year, rising from seven cruise ships in 2003 to more than doubling by 2008 with

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<sup>132</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 45.

<sup>133</sup> Ron Wallace, "Emerging Canadian Priorities":6.

<sup>134</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 21.

15 vessels conducting 26 transits and guiding over 2,400 passengers through the Canadian Arctic.<sup>135</sup> While these cruises continue to increase in popularity, their tendency to venture into new and uncharted waters places them at an increased risk for emergencies and would constitute a particularly challenging rescue for SAR to perform. As previously mentioned, marine tourism is outpacing Arctic infrastructure investment, development, and support. The quantity of passengers to be rescued would outnumber the capacity of most available SAR response vessels and aircraft; and local Arctic infrastructure does not possess the capacity to feed, house, and service such a large number of people.<sup>136</sup> As a result, in the case of a cruise ship emergency resulting in a mass rescue operation, the sheer scale and scope of the operation would overload Arctic infrastructure. This reality was highlighted in 2010 following the grounding of the cruise ship *Clipper Adventurer*, drawing attention to both the safety issues surrounding Arctic tourism and the limitations of Canada's Arctic SAR capacity and capabilities.<sup>137</sup>

Intensifying the already challenging situation of a large scale rescue in the Arctic, cruise ships also have a limited capacity for self-rescue. Despite the International Maritime Organisation's safety guideline for passenger vessels, compliance is voluntary which implies that each ship's plan for and capability of self-rescue will vary.<sup>138</sup> As a result, between the Arctic's harsh climate, the time required for SAR to arrive on scene, and the lacking self-rescue capacities of passenger vessels, victim survival rates are greatly reduced. This is further exacerbated by the fact that under emergency circumstances, some passengers are likely to be ill-equipped for the Arctic weather.<sup>139</sup> However, policies and guidelines can significantly mitigate

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<sup>135</sup> Ron Wallace, "Emerging Canadian Priorities":6; William Russell, "A Proposed Arctic Search and Rescue Strategy": 36.

<sup>136</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 21.

<sup>137</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 37.

<sup>138</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 21.

<sup>139</sup> Ibid.

the dangers and challenges associated with most cruise ship emergencies as evidenced by marine tourism in the Antarctic.

In 2007, after suffering damage to its hull, the cruise ship *Explorer* sank in the Antarctic, however all passengers and crew were safely taken aboard the Norwegian cruise ship *Nordnorge* as per the contingency plan developed and implemented by the International Association of Antarctic Tour Operators (IAATO).<sup>140</sup> The IAATO created a self-rescue policy whereby vessels are paired for mutual rescue assistance as other cruise ships represent one of the only platforms with the capacity and capability of feeding and housing all the rescued passengers.<sup>141</sup> Recognising the merits and benefits of such a policy, the Danish navy is similarly advising cruise ships to travel in pairs in Greenland waters, acknowledging the fact that it takes a cruise ship to rescue a cruise ship as other vessels simply would not have the capacity.<sup>142</sup> Therefore, as the events in the Antarctic show, it is not a question of if, but a question of when a large marine incident will occur.

In addition to cruise ships, the increasing accessibility to the Arctic has also increased the number of pleasure crafts visiting the region with 12 recorded privately owned vessels traveling the NWP in 2009 and 17 in 2010.<sup>143</sup> These vessels vary both in size and type and represent a serious concern for SAR as recreational boaters consistently represent the vast majority of SAR incidents within Canada.<sup>144</sup> What is further concerning is the fact that many of these pleasure vessels are not listed under Arctic legislation and can enter the NWP unbeknownst to Canadian authorities, which can complicate searching efforts.<sup>145</sup> Additionally, like Arctic cruise ships,

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<sup>140</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 37.

<sup>141</sup> Joseph Spears and Michael Dorey, "Arctic Cruise Ships": 20-21.

<sup>142</sup> Brad Judson, "Trends in Canadian Arctic Shipping Traffic—Myths and Rumours."

<sup>143</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 46.

<sup>144</sup> Department of National Defence, "Trenton Search and Rescue Region"

<sup>145</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 46.

pleasure boaters in the north have an increased risk of requiring SAR assistance due to the regions challenging climate, shifting ice, and navigational difficulties. This is particularly true as even in southern Canadian waters which have accurate and complete charts and navigational aids, marine incidents are still a standard occurrence.

### ***Section Summary***

The Arctic is an exceptionally challenging region within Canada to provide essential SAR services. This is not only true due to its unique environmental challenges, but its sparse and isolated populations, the distances southern-based SAR resources must travel, the lack of general and supportive infrastructure, and less than optimal situational awareness. These obstacles make the provision of SAR services in the Arctic increasingly difficult and complex, resulting in the system's current capacity and capabilities being scarcely able to meet service needs and will likely be unable to support any substantial increases in its demand. Besides the challenges inherent in the Arctic, climate change is leading to a decline in Arctic ice-coverage and is increasing accessibility to the region. This is projected to cause significant increases in Arctic activity with substantial consequences for SAR. Specifically, increases in human activity are anticipated to take the form of resource exploration and development, increased shipping such as community resupply, commercial and pleasure aviation and finally Arctic tourism.

Despite much debate over the NWP, the majority of the increases in Arctic activity will not be from international shipping due to the passage's unpredictability, difficult navigation, and questionable economic advantages. In spite of this, increases in Arctic activities are still expected and will be primarily driven by resources, growing Arctic communities, polar overflights and Arctic tourism. The resulting increases in both air and maritime travel due to greater activity will enhance the risk for incidents and subsequently increase the regions SAR needs. However, certain activities, such as those pertaining to resource development and extraction, pose even

greater challenges to SAR as they are particularly hazardous and prone to emergencies. Another particularly concerning threat to SAR is its capacity to mount a mass rescue operation. With both passenger cruise and aircraft now traveling throughout the Arctic, there is a distinct possibility of a major disaster occurring in the Canadian North to which rescue responses must take place. The danger here is that SAR resources do not possess the capacity necessary to effectively recover such a large number of people, and Arctic infrastructure does not have the capacity to accommodate and care for that many people. In fact, the ability to mount even small scale operations in the Arctic under existing conditions is difficult because of the inherent stress points within the SAR system and the Arctic's regional challenges, particularly its lack of basic infrastructure.

The Arctic represents a challenging region for SAR not only owing to its environment and growing service needs, but because Canada's SAR system is generally experiencing difficulties in ensuring the country's SAR demands remain satisfied. Without improvements to the nation's SAR program addressing issues pertaining to personnel, training, equipment, technology, and governance; the system's overall ability to provide essential emergency services throughout the country will be considerably impaired. In its current state, the system labours to meet service needs and does not possess the capacity to satisfy an increase in SAR demands. Consequently, this system, which is already experiencing mounting difficulties in the provision of response and recovery services, will increasingly be unable to adequately meet the Arctic's growing needs; jeopardising the safety of all who live and travel in the North. While this is a stark reality for Canada's SAR program, it can be avoided- if not mitigated, through the adoption of one or more improvement strategies.

### **Options for Improving Arctic SAR**

While Canada's rescue system has served well in the past, its dwindling ability to satisfy Arctic and nation-wide SAR needs is concerning. Canada's SAR demands are evolving and, as a

result, its rescue policies and strategies must also change so as to remain relevant and effective. Although its SAR program faces significant challenges and stresses, it is not too late to prepare for the growing and changing needs of its people, particularly those in the Arctic. This following section will identify and describe five main alternatives available for improved SAR policies and services.

### ***Status Quo: Asset Enhancement***

This alternative will see the continued employment of the current NSP while moving along with its scheduled asset replacements and upgrades. This option recognises that the NSP has served the country very well, yielding a high rate of success and earning Canada the reputation as having one of the most effective SAR services in the world. However, it also recognises that the continued use of old and outdated resources causes weaknesses in both the system and the provision of SAR services, potentially endangering lives. As a result, this alternative seeks to replace old and outdated resources to enable to continued provision of adequate SAR services. Specifically, this alternative seeks the replacement of the CF's ageing Buffalo and Hercules FWSAR planes along with the replacement of the outdated SAR information system. These asset enhancements are expected to improve SAR capacity and capabilities through increased fleet readiness and reliability, greater availability for personnel training, access to new technologies facilitating searches, as well as improved coordination, data recording, and visual information quality essential for decision making and mission management.

While asset enhancement will undoubtedly lead to an alleviation of strain on Canada's SAR system, the delayed replacement of these assets has allowed for little to no transitional period for personnel to train or become proficient on new equipment, technology, and systems. The current fleets of FWSAR aircraft are anticipated to become unserviceable beginning in 2015

and 2017 while their replacements are not expected to be arriving until 2017 at the earliest. Similarly, the SAR information system is near un-usability and has already experienced a system failure; however the replacement of this frail system is not scheduled until 2015-16. The possible failure of the information system, equipment unfamiliarity and lack of training will all contribute to an increased likelihood of errors which could lead to an emergency situation. Furthermore, this option fails to address the systemic weaknesses within Canada's SAR program as well as neglects to take pre-emptive action in responding to the emerging and transforming SAR needs of the country. Although the status quo involving the replacement of old resources represent an initial move towards the sustainment of adequate SAR services, it alone is insufficient.

### ***The Establishment of a National SAR Policy Framework***

A major hindrance to the successful conduct of SAR operations is the lack of a unifying national policy framework. According to York University Professor Martin Shadwick, it can be argued that Canada's SAR problems take root in the NSP's governance deficiencies as it alone persistently causes great challenges to SAR provision.<sup>146</sup> Organized based upon already existing infrastructure, resources, and personnel; the NSP's 'system of systems' structure requires a policy framework to govern and coordinate SAR activities to ensure coordinated, efficient and effective service. In the absence of such a framework, each SAR authority is free to set and direct its own priorities, service requirements, standards, and coordination procedures; resulting in disjointed and varying services which place lives at greater risk.<sup>147</sup> The establishment of a national SAR policy framework would produce not only a national SAR policy and governance framework, but create national standards for SAR services and a program performance measurement framework. This will result in a clear set of national priorities, service

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<sup>146</sup> Martin Shadwick, "Reflections on Search and Rescue": 75.

<sup>147</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 24.

requirements, measurable standards and program performance, coordination procedures, governance structures, and possibly region specific management policies in special cases. Due to the scope and the nature of such a framework, it demands a comprehensive review of the national SAR system, structures, and departments involved so as to acquire a clear picture of Canada's SAR environment and subsequently develop the most suitable policy framework. It should be noted that although a national policy would improve the structure and workings of the Canadian SAR system, each member's adherence would be self-regulated and may require the creation or appointment of a single organisation responsible for overseeing SAR coordination and policy obedience to help achieve seamless collaboration, coordination and interoperability.

### ***Northern Operating Bases***

The creation of northern bases is one of the most frequently recommended options for the improvement of Arctic SAR service delivery. This option possesses several variations including the establishment of a permanent central Arctic operating base, temporary forward operating bases, as well as recommendations for an international Arctic SAR centre modeled after the NATO Centres of Excellence. Despite these deviations, this alternative seeks to address one of the biggest obstacles to the provision of Arctic SAR assistance: staging and access issues due to distances southern resources need to travel before arriving on scene. By strategically positioning essential resources within the Arctic region, both the CF and the CCG would stand to obtain a greater SAR capacity within the Arctic region, as well as improved rapid response to SAR incidents in the north. Additional benefits to locating a base in the Arctic include the acquisition of necessary infrastructure, resources, and situational awareness for the further support of emergency northern response and recovery operations.

However, the estimated long-term logistical operating cost of an expanded presence of the CF in the Arctic region can cost anywhere from \$843 million to \$1 billion.<sup>148</sup> These operational expenses, which exclude construction and development costs, are very high due to the Arctic's isolated nature coupled with its harsh living environment. Although these bases offer a way to ensure closer lifesaving resources to potential victims in the North, given its small population, current low volume of traffic, and high operational costs, northern operating bases may not be an efficient and effective use of limited SAR resource. Particularly since even in busy SAR centres, responding to emergency incidents represent only 2.5 percent of the centres total activity.<sup>149</sup>

### ***Establishment of Regional Based initiatives in the Arctic***

A regional based initiative is the establishment of local SAR capabilities based upon pre-existing resources and infrastructure. Essentially, this option would take advantage of the skills and resources available at the community level with the purpose of assisting the national SAR program. This initiative would be a way for the government to enhance SAR capabilities by reaching out to local communities. Specifically, these initiatives would take advantage of volunteer organisations like CASARA (North) as well as the Canadian Rangers. The utilisation of these resources present several advantages and benefits to the current SAR structure as they are typically located within close proximity of an incident; possess extensive experience with northern conditions; and occupy great situational awareness concerning the regional environment and hazards.<sup>150</sup> In essence, the government would be employing SAR service partners at the local level to help supplement Arctic SAR services.

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<sup>148</sup> Ron Wallace, "Emerging Canadian Priorities":4.

<sup>149</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 63.

<sup>150</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 88.

CASARA is a volunteer association which works to provide “trained and effective air search support services to supplement our National Search and Rescue program.”<sup>151</sup> Currently, this association comprises roughly 25 percent of Canada’s air search capability and utilises both local civilian and chartered aircraft, with the help of trained spotters, to support the locating of incident victims.<sup>152</sup> The implementation of this organisation in Canada’s northern region would not only take advantage of the local supply of aircraft to enhance SAR coverage in remote Arctic areas, but also save essential time by locating accident victims prior to the arrival of FWSAR aircraft from southern bases. In 2011, the government announced an agreement to provide CASARA with additional funds to improve SAR capabilities in Nunavut noting that should it prove successful, improvements in the other territories would also be considered.<sup>153</sup> While this association strictly takes advantage of a region’s fixed-wing assets, a similar association and system could also be established with regards to utilising local rotary-wing assets to further enhance SAR operations in the Arctic.

The Canadian Rangers is a subcomponent of the Canadian Forces Reserves under the Canada Command’s Joint Task Force (North). These members can be found across the Arctic in 57 of the 71 northern communities.<sup>154</sup> Retired Colonel Leblanc has long been an advocate for increasing the Rangers capacity for SAR, citing their extensive knowledge of the land, survival skills, scattered presence, as well as their cost effective and inexpensive nature make them ideal support for responding to a SAR emergency.<sup>155</sup> However, Rangers are limited in that they do not have dedicated SAR equipment and are restricted to the use their own personal equipment.

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<sup>151</sup> "Ready to Respond in Any Situation," *CASARA National*, Accessed March 19, 2014, <http://www.casara.ca/about-casara/what-we-do-services/>.

<sup>152</sup> Ron Wallace, "Emerging Canadian Priorities":4.

<sup>153</sup> Ibid.

<sup>154</sup> Standing Senate Committee on National Security and Defence, "Sovereignty & Security in Canada’s Arctic":6-7.

<sup>155</sup> Ibid: 7.

### *Self-Rescue*

Self-rescue is the adoption and implementation of self-saving policies whereby travelers within the Arctic attempt to manage their own risks and reduce their chances of emergency while also enhancing survival capabilities. The Arctic is a remote and hazardous place where the conduct of any activity sees a greater chance of misadventure as well as increased risks for loss of life due to the regions difficult geography, severe weather and lengthy SAR service timeframes. As a result, the implementation of risk management policies, such as self-rescue, will help alleviate growing Arctic SAR demands while also serving to increase extended survival capabilities; thus reducing the likelihood for loss of life in the Arctic. While self-rescue is a best practice everyone should employ, the implementation of it within the Arctic tourism industry would be of particular benefit, as these travellers represent a larger portion of SAR calls and are more inclined to be unprepared for the Arctic environment.<sup>156</sup> Specifically, as the IAATO cruise ship self-rescue contingency plan has demonstrated, the adoption of self-rescue policies in the cruise ship industry can be particularly advantageous. Although self-rescue this is not a substitute or supplement for Arctic SAR resources and services, it is a supportive option which will limit the likelihood of a SAR emergency while also fostering extended survival capabilities which will increase chances for survival.

### **Recommendation**

For the continued provision of adequate SAR services, it is recommended that a national SAR policy framework be established; region-based SAR initiatives be implemented; and self-rescue policies employed.

The lack of a national SAR governance system was first identified as a major systemic issue by the government in 1976 and despite several attempts by the NSS since 1986, there

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<sup>156</sup> William Russell, "A Proposed Arctic Search and Rescue Strategy": 46.

continues to be no governing or policy framework for SAR.<sup>157</sup> This is both inefficient and problematic as a horizontal and multi-jurisdictional system, like the NSP, must have a clear set of national priorities, service requirements, measurable standards and program performance, coordination procedures, and governance structures in place in order to achieve effective operation and function. Without a strong foundational base from which to build and grow, there will be a lack of system coherence and cohesion resulting in uncoordinated and differing services. Without a proper governance structure, SAR will continue to suffer from the same systemic and generational issues despite the best efforts of SAR personnel or the use of the most capable and technologically advanced equipment. As a result, the enhancement of SAR assets alone will not resolve or eliminate the challenges and issues currently facing Canada's SAR system. With the implementation of a proper national SAR governance and policy framework, the Canadian SAR system will be better able to measure SAR performance and ensure it is able to adequately meet demands, as well as adjust to meet growing or changing SAR needs.

The Arctic is an emerging challenge for SAR. Its decreasing ice cover is allowing for an increase in activity within this hostile and hazardous region. This activity is anticipated to result in growing SAR needs and demands, something that the system is not currently equipped to handle. Despite several calls to establish northern SAR bases and resource positioning, the regions small population, comparably low volume of traffic, and high operational costs would not constitute an efficient and effective use of limited SAR resource. Although Arctic activity is growing steadily, it still pales in comparison to the activity levels obtained in more southern regions of the country. At this stage in the Arctic's development, the repositioning of SAR resources and the creation of northern bases are not warranted, however the current SAR program is increasingly struggling to sustain adequate Arctic SAR capabilities. It is therefore

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<sup>157</sup> Auditor General of Canada, "Federal Search and Rescue Activities": 23.

recommended that regional based initiatives as well as self-rescue policies be adopted so as to support the provision of service in the Arctic.

Regional based initiatives will exploit and build upon existing local SAR capabilities, including the Canadian Rangers and CASARA (North), to enhance response capacity in the region. Essentially, due to the fact that these are local assets, they can provide rapid response to incidents arriving either on scene, drop emergency equipment, or begin search operations. Additionally, these resources possess extensive experience with northern conditions as well as great situational awareness concerning the regional environment and hazards. As a result, these resources are very useful to SAR personnel and serve to facilitate and support SAR operations. The development of similar initiatives such as a rotary-wing component to CASARA can serve to further supplement and support the provision of SAR services in the North.

Self-rescue policies, although do not necessarily provide support for SAR operations in the Arctic, serves as a preventative measure to reduce both the occurrence and severity of emergency situations. By implementing risk management policies, it helps to alleviate growing Arctic SAR demands through prevention while also developing extended survival capabilities and contingency plans for increasing chances for survival. Although implementation of self-rescue policies may take time to become effective, it is an advantageous long term strategy for the reduction of SAR emergencies.

## **Conclusion**

The Arctic represents a very challenging region for SAR due not only to its austere environment and growing service needs, but to Canada's SAR system experiencing troubles in ensuring the current SAR demands remain satisfied. Without improvements to issues pertaining to personnel, training, equipment, technology, and governance; the system's overall ability to

provide essential emergency services throughout the country will be considerably impaired. In its current state, the system labours to meet service needs and does not possess the capacity to satisfy any increase in SAR demands. Consequently, this system will increasingly be unable to adequately meet the Arctic's growing needs; jeopardising safety in the North. While this is a bleak situation for Canada's SAR program, the establishment of a national SAR policy framework, the implementation of region-based SAR initiatives, and employment of self-rescue policies will increase system capacity and efficiency making it increasingly able to sustain SAR services.

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