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MIND THE GAP: THE GROUND TRUTH BEHIND AN OPTIMIZED NATIONAL SEARCH AND RESCUE SYSTEM

Maj J.M. Weissenborn

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Maîtrise en études de la défense

Canada

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Maj J.M. Weissenborn

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LIST OF ABBREBIATIONS

AAD ………………………… Australian Antarctic Division

ADF …………………………. Australian Defence Force

AMSA ……………………… Australia. Australian Maritime Safety Authority

ANU ………………………… Australian National University

CAF …………………………. Canadian Armed Forces

CAMSAR …………………… Canadian Aeronautical and Maritime Search and Rescue Manual

CAS………………………….. Chief of Air Staff

CAS …………………………. Complex Adaptive System

CASA ……………………….. Civil Aviation Safety Authority (Australia)

CASARA ……………………. Civil Air Search and Rescue Association

CBSA ……………………….. Canada Border Services Agency

CCG ....Canadian Coast Guard

CF..Canadian Forces

CFC ....Canadian Forces College

CMCC ....Canadian Mission Control Centre

CORA ....Centre of Operational Research and Analysis

CSA...Canadian Standards Association

DFO ....Department of Fisheries and Oceans

DHS ....Department Homeland Security

DND ....Department of National Defence

DOT ....Department of Transport

DRDC ....Defence Research and Development Canada

ELT ....Emergency Locator Transmitter

EMS ....Emergency Medical Services

FERP ....Federal Emergency Response Plan

FLIR ....Forward Looking Infra-red

FPT ....Federal, Provincial, Territorial

FWSAR ....Fixed-Wing Search and Rescue

GSAR ....Ground Search and Rescue

HQJOC ....Headquarters Joint Operations Command

IAMSAR ....International Air and Marine Search and Rescue

ICAO ....International Civil Aviation Organization

ICMSAR ....International Convention on Maritime Search and Rescue

ICSAR ....Interdepartmental Committee on Search and Rescue

IGA ....Intergovernmental Agreement

IMO ....International Maritime Organization

JRCC ....Joint Rescue Coordination Centre

KMS ....Knowledge Management System

LMSAR ....Lead Minister Search and Rescue

MCCRT ....Management Command and Control Re-engineering Team

MCTS ....Marine Communications and Traffic Service

MOU ....Memorandum of Understanding

MND ....Minister of National Defence

MRSC ....Marine Rescue Sub-Centre

MSOC ....Maritime Security Operations Centres

NASP ....National Aerial Surveillance Program

NATO ....North Atlantic Treaty Organization

NDHQ ....National Defence Headquarters

NORAD ....North American Air Defence

NSM ....National SAR Manual (Canada)

NSP ....National Search and Rescue Program

NSS ....National Search and Rescue Secretariat

NSW ....New South Wales

NVMSARC ....National Volunteer Marine Search and Rescue Committee

OAG ....Office of the Auditor General

OIC ....Officer in Charge

PLB ....Personal Locator Beacon

PS ....Public Safety

RAAF ....Royal Australian Air Force

RAC ....Royal Automobile Club

RCAF ....Royal Canadian Air Force

RCC ....Rescue Coordination Centre

RCMP ....Royal Canadian Mounted Police

RCN ....Royal Canadian Navy

ROESAR ....Report on an Evaluation of Search and Rescue.

SAR ....Search and Rescue

SARVAC ....Search and Rescue Volunteer Association of Canada

SCC ....Search and Rescue Coordinating Committee

SCOFO ....Standing Committee on Fisheries and Oceans

SOA ....Special Operating Agency

SOLAS ....International Convention for Safety of Life at Sea

SRR ....Search and Rescue Region

STIP ....Strategic Transition Initiative Project

TC ....Transport Canada

UN ....United Nations

UNCLOS ....United Nations Conference on the Law of the Sea

UK ....United Kingdom

US ....United States

USCG ....United States Coast Guard

UV/IR ....Ultra-violet / Infra-red

VHF ....Very High Frequency

WoG ....Whole of Government

ABSTRACT

Canada has the resources, the enthusiasm and the intent to realize an effective and efficient national search and rescue (SAR) system. However, a plan and policy framework to bring the disparate elements together into a coherent and unfailing service has remained beyond reach. Sometimes this deficiency has resulted in well publicized national tragedies or disasters, but just as troubling are the untold stories of those who may not have been rescued in time.

To determine the need for such a framework, this study researched whether there were grounds for a comprehensive and integrated SAR service. To this end, Canada's organizational SAR history, international obligations, Australia's approach and finally contemporary opportunities were examined. Not only was a comprehensive approach unequivocally supported, but the existence of current agencies and organizations provide a better opportunity than ever to pursue a dynamic, risk-based, and integrated national SAR system. Such a construct will prove responsive and sustainable because integrated participation allows designated resources to effectively and efficiently respond at appropriate times. It promises to be a system that provides an equitable, risk-based search and rescue service to Canada's entire search and rescue region.

ACKNOWLEDGEMENTS

INTRODUCTION

Canada's auditor general says the country's system of search-and-rescue is in distress and some elements are near the 'breaking point.'

Comments such as this one from Murray Brewster of the *National Post*[1] indicating a "crisis" in Canada's Search-and-Rescue (SAR) system have been echoed in other headlines. The 2013 Auditor General's report provided the impetus to examine Canada's current search and rescue system. Noting that the delivery of SAR currently lacks coherence, the report focused on the need for a SAR framework that would provide a more effective and efficient SAR service to Canadians through the establishment of an integrated, comprehensive and holistic approach to SAR delivery.[2]

The current lack of a SAR framework makes it difficult to achieve an efficient and effective SAR system because there is no national baseline for measurement. Though all people associated with the SAR system, both paid and volunteer, provide dedicated and enthusiastic service to save lives, the absence of plans and policies causes difficulty in identification of national needs based on a common reference point.[3]

Such absence of a coherent structural framework to connect the elements of *ends, ways* and *means*[4] results in the inability to optimize SAR delivery. This creates a cross section of

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[1] Murray Brewster, "'Canada's search-and-rescue system at 'breaking point,' auditor general's report says." *National Post* 30 April 2013. http://news.nationalpost.com/news/canada/canadas-search-and-rescue-system-at-breaking-point-auditor-generals-report-says.

[2] Office of the Auditor General, *Report of the Auditor General of Canada to the House of Commons, Chapter 7: Federal Search and Rescue Activities* (Ottawa: Office of the Auditor General of Canada Distribution Centre, 2013), 23. http://www.oag-bvg.gc.ca/internet/ English/parl_oag_201304_07_ e_38192.html.

[3] *Ibid.*, 23-24.

[4] Richard Yarger, "Toward a Theory of Strategy: Art Lykke and the U.S. Army War College Strategy Model," In *The U.S. Army War College Guide to National Security Issues Volume I: Theory of War and Strategy* 5th ed, ed. J. Boone Bartholomees, Jr (Carlisle, PA: U.S. Army War College, 2012), 45; P.H. Liotta, and Richmond M. Lloyd, "The Strategy and Force Planning Framework," In *Strategy and Force Planning* 4th ed, ed. Security, Strategy, and Forces Faculty (Newport, RI: Naval War College Press, 2004), 5-6. Ends, ways, means is a strategy formulation model by Art Lykke that articulates how (*ways*) to link objectives (*ends*) with resources (*means*). Other Strategy

issues such as: accountability; resource definition, for example the fixed-wing (FW) SAR project; resource response times; and interagency communications. Though political grey areas provide room to manoeuvre, and dispersed responsibility creates lesser accountability, when it comes to saving lives there is no room for grey.

The issue of resource response times has raised concerns for Arctic SAR because of the long transit times to reach SAR incidents in the far north.[5] However, timely SAR response in Canada's northern regions is simply another example of an integrated and interoperable national SAR plan's benefits – a coordinated, integrated, response that uses all available resources (private, public and volunteer) to come to the aid of those in peril.[6] Further, such a national plan could be risk managed with such considerations as season and availability of known transient resources that could be used as a SAR resource. This approach would dynamically assess and mitigate SAR coverage in all of Canada and provide the Arctic with the same residual risk as anywhere else, not as a separate item but as part of a comprehensive SAR approach.

A comprehensive and integrated SAR system would also prove sustainable. In some countries, such as the United Kingdom, public SAR services have recently been privatized.[7] While private industry has a part in an integrated SAR system, and charter resources are already used when they are both capable and close to an incident, to completely privatize SAR in Canada would not provide the level of integration that this paper proposes. The Royal Canadian Air Force's (RCAF) continued participation in SAR not only fulfills a core National Security Policy

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formulation frameworks (Liotta and Lloyd) connect ends and means via a strategy (instead of the term way) but the concept remains the same.

[5] Joseph Spears, "Staying alive – The present state of Arctic SAR," *Canadian Sailings* 04 November 2015. http://www.canadiansailings.ca/?p=10611.

[6] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 3.

[7] Defence Industry Daily, "Britain's Next Search-and-Rescue Helicopters: Civilian Contractors," last accessed 28 September 2015. http://www.defenseindustrydaily.com/british-searchandrescue-a-billion-pound-partnership-02271/.

interest of protecting Canadians, but provides a practical opportunity to keep personnel skills

honed for other operations while connecting with Canadians through a valued service.[8] Further,

realization of a fully integrated national SAR system logically allows the RCAF to achieve the

operational multirole objectives envisioned in *Air Force Vectors*.[9]

Central to delivery of a dynamic, multi-resourced SAR system would be integrated Joint

Rescue Coordination Centres (JRCC). A 24/7 comprehensive SAR picture, SAR resource

positions and high risk areas must be actively managed. Integration with existing federal

structures, such as Maritime Surveillance Operations Centres, would provide the necessary

information.[10] The best aspect is that the information sources already exist; all that is needed is a

policy that directs seamless fusion between the entities. That policy and accompanying plan

would come from a SAR framework.

The Auditor General's report concluded that the missing framework resulted in

inadequate oversight of SAR. As a result, the report assessed Canada's air and marine SAR

system as *adequate* and further surmised that "significant improvements were needed in order to

remain adequate."[11] Adequate is an unacceptable grade for a lifesaving service and one cannot

even be certain of that mark as there is no national baseline for performance. Such findings are

indeed troubling. Accordingly, this study proposes that a SAR plan and policy framework that is

comprehensive and risk-based – with deliberate multipurpose and cross-jurisdictional resource

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[8] Privy Council Office, *Securing an Open Society: Canada's National Security Policy*, (Ottawa: Privy Council Office, 2004), vii. http://publications.gc.ca/collections/Collection/ CP22-77-2004E.pdf.

[9] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors,* (Ottawa: Director General Air Force Development, 2014), 41.

[10] Government of Canada, "Marine Security Operations Centres," last modified 09 November 2015, http://www.msoc-cosm.gc.ca/en/about-us.page.

[11] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 24-25. Emphasis added.

capabilities – will optimize the effectiveness and efficiency of this lifesaving service and provide a sustainable national SAR system.

To justify such a system, this study will review international SAR obligations, examine another country's SAR system, look back at the evolution of Canada's SAR system and finally present considerations for realization of a SAR framework. Although this study will focus on the air and maritime responsibilities, synergies with the ground SAR responsibilities will be underscored when relevant. Further, the employment of resources will focus heavily on the Canadian Armed Forces, with parallels drawn where relevant, to the Canadian Coast Guard (CCG) activities.

A challenge that presents itself is the dearth of literature and academic references that directly examine the organizational facets of Canada's SAR system. This is perhaps reflective of a larger issue related to Canadian Forces record keeping in general, as noted by military historian Rachel Lee Heide.[12] While it is likely that records exist, their ready accessibility proves difficult. This has not gone unaddressed. The National SAR Secretariat (NSS) launched a knowledge management system (KMS) on 18 July 2015 intended to capture all facets of national information at one location; however, the reference library as yet contains few documents.[13] Nonetheless, this KMS library is a noble initiative and the culmination of extensive effort and expertise from within the NSS. In the absence of direct documentation, inference must be made

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[12] Rachel Lea Heide, "Canadian Air Operations in the New World Order," in Allan D. English, ed., *Air Campaigns in the New World Order.* Silver Dart Canadian Aerospace Studies Series, Vol 2 (Winnipeg: Centre for Defence and Security Studies, 2005), 79.

[13] National Search and Rescue Secretariat, "Search and Rescue Knowledge Management System (SAR KMS)," last Modified 04 August 2015, http://www.nss-snrs.gc.ca/en/knowledge-managment.page. Note: a password is required to access the database portal. Two documents that were posted: Minister of Energy, Mines and Resources, Memorandum to Cabinet, "Response to the recommendations of the Royal Commission on the Ocean Ranger disaster," (14 February 1986); and Department of National Defence, "New arrangements to strengthen the central management of Search and Rescue in Canada [Department of National Defence submission to Treasury Board]," (18 June 1987). Likely other files exist at Library and Archives Canada.

based on history books, magazines and departmental reports. Although parts of Canada's SAR narrative are being filled by recent Canadian Forces College (CFC) research, like those studies, this paper has been developed through use of interspersed primary and secondary sources as well as Royal Canadian Air Force and Canadian Coast Guard history books.[14]

Secondary sources, such as squadron history books (primarily *Seek and Save: The History of 103 Rescue Unit* due to its geographical east coast location), were used to gain insight into events that drove RCAF and SAR activities. Additionally, the CCG history book *Usque ad Mare: A History of the Canadian Coast Guard and Marine Services*, provided organizational linkages and helped bracket dates for archival searches of primary documents. In some cases this paper referenced secondary source media information in lieu of the primary SAR record database to alleviate the accessibility issues previously identified and thus promote unfettered distribution of SAR information.

Primary source material drew upon international SAR documents, notably the *International Convention on Maritime SAR* and the *International Air and Marine SAR Manual,* as well as governmental and departmental reports. The reports included the *Report on an Evaluation of Search and Rescue,* the *Royal Commission on the Ocean Ranger Marine Disaster*, NSS annual reports and Australian SAR Council reports. The international documents and Canadian reports necessarily substituted for the academic literature deficiency regarding justification for a comprehensive SAR framework. The Australian reports, as well as their

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[14] Clint Mowbray, "Lessons Forgotten? A Historical Examination of the RCAF Search and Rescue Organization" (Joint Command and Staff Program Master of Defence Studies, Canadian Forces College, 2014), 4; D. Poitras, "Search and Rescue in the Arctic: A Myth or a Reality?" (Joint Command and Staff Program Master of Defence Studies, Canadian Forces College, 2013), 6-7. Note: both these studies noted the lack of readily accessible SAR literature.

National SAR Manual, were mainly used in order to examine Canada's SAR system against the multipurpose approach undertaken by another country.

In light of the information paucity, this paper aims to add to the body of SAR literature and recent CFC academic contributions by showing the pivotal importance of a SAR framework to the overall functioning of a national SAR system. To that end, the paper is divided into four chapters.

The first chapter is an examination of international responsibilities arising from Canada's membership in the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), with practical examples of how Canada's SAR system relates to international practices contained in the SAR manuals of these organizations. Chapter two will examine how Australia, a country with similar challenges to Canada, manages their SAR system. The intent is to present an alternate option and practical example of how international obligations and national needs are fulfilled. Chapter three will look back at the evolution of Canada's SAR system to demonstrate the reasoning behind the development of existing capabilities. Although chronological, the focus of this chapter is upon the organizational aspect and whether the organizational entities have met federal government direction and adapted to effectively and efficiently meet emerging SAR challenges.[15] Finally, chapter four proposes elements that accept the challenges and leverage the opportunities inherent in an integrated SAR system while describing how current federal departments and entities would facilitate establishment of an integrated SAR framework.

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[15] Mowbray, "Lessons Forgotten? A Historical Examination of the RCAF Search and Rescue Organization." Note: for a full historical examination of technical and operational aspects of Canada's SAR system please see this paper.

While it is logical that a more effective and efficient system should devolve from a coherent plan and policy framework, Canada's SAR system must ensure that current international SAR obligations continue to be met. Examination of the international SAR agreements to which Canada is signatory to provides an inarguable point of reference. Therefore, whether or not such a framework would be viable within these constraints is a logical place to start.

Chapter 1 – INTERNATIONAL SAR OBLIGATIONS AND DERIVED STANDARDS FROM AGREEMENTS

Introduction

The purpose of a basic examination of international SAR agreements is twofold. Firstly, it is important to review the requirements as they represent the culmination of global expertise and consensus. Secondly, international obligations, recommendations, and standards could provide substantiation for a SAR framework that uses multipurpose, cross-jurisdictional resources to achieve an effective and efficient SAR system.

The relevant international conventions are: *Convention on International Civil Aviation (ICAO), Annex 12; International Convention for the Safety of Life at Sea (SOLAS);* and, *International Convention on Maritime Search and Rescue (ICMSAR).* The ways to operationalize and fulfill the above conventions are contained in *the International Air and Marine Search and Rescue* (IAMSAR) manual. Whatever adjustments might be made to Canada's SAR system it must still fulfill the expectations of the international community as well as satisfy obligations contained in these international agreements.[16] Provision of this context as a foundation may allow better understanding of the later sections of this study.

ICAO Convention on SAR

The ICAO has a long and cherished connection to Canada. The city of Montreal has been the host city of ICAO since its inception in 1947, and in May 2013 the Government of Canada signed an agreement to extend Montreal as ICAO's home for another 20 years.[17] This fact serves

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[16] International Maritime Organization / International Civil Aviation Organization, *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual. Volumes I-III (*London: IMO/ICAO, 2003), Vol I, 1-2.

[17] Global Affairs Canada, "Team Montréal Makes It Official: ICAO HQ Here to Stay," last modified 25 July 2014, http://www.international.gc.ca/media/aff/news-communiques/2013/05/27a.aspx?lang=eng.

to highlight the fact that Canada is not only a signatory state, but has played, and should continue to play, a leading role in the aim of ICAO, whose purpose is to achieve the safe, efficient, secure and sustainable development of civil aviation.[18] Specifically, this study advocates promoting Annex 12, the section that contains the international standards and recommended practices for SAR.

Annex 12 notes the requirement to have a legal framework, a responsible authority, organized resources, and an established process to improve service provision as well as domestic and international arrangements. It further states the requirement to designate both public and private SAR units that are suitably located and have a plan of operation that designates all elements able to participate in SAR operations.[19] Although Canada largely adheres to Annex 12, it will be shown in chapter 3 that the responsible authority and processes to improve SAR provision have proved problematic.[20] In addition, although Canada has international arrangements with adjacent SAR regions, domestically, Canada does not specifically designate all resources able to undertake SAR operations.[21]

Convention for the Safety of Life at Sea

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[18] International Civil Aviation Organization, "About ICAO," last accessed 12 December 2015, http://www.icao.int/about-icao/Pages/default.aspx.

[19] International Civil Aviation Organization, *International Standards and Recommended Practices Annex 12: Search and Rescue,* (Montreal: ICAO, 2004), 2-1, 2-2.

[20] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 20, 23. Note: The Minister of National Defence was appointed the Lead Minister for SAR in 1976. The Lead Minister is thus responsible for SAR service provided by departments and agencies that are not under the Defence purview. The National SAR Secretariat was assigned to develop a SAR framework in 1986 and yet the 2013 Auditor General's report finds that a framework is missing.

[21] Department of National Defence/Canadian Coast Guard, B-GA-209-001/FP-001-DFO 5449, *National Search and Rescue Manual,* (Ottawa: DND/CCG, May 2000), Chapter 1 page 11; Department of National Defence/Canadian Coast Guard, B-GA-209-001/FP-001-DFO 5449, *Canadian Aeronautical and Maritime Search and Rescue Manual,* (Ottawa: DND/CCG, 2014), 1.08, 1of 3.

As long as the fate of the Royal Mail Ship *Titanic*'s crew and passengers remains high in social consciousness, the International Convention for the SOLAS will be cited as one of the first documents pertaining to SAR. Canada, a signatory to this 1974 convention, is obliged to provide SAR services along its coastlines and oceans.[22] SOLAS also dictates the mandatory lifesaving equipment that must be carried aboard vessels. These two aspects of SOLAS provide an example of how safety equipment that is *required* to be carried is fundamentally necessary to prolonging survival until rescue can be accomplished. [23]

Such pairing of the regulatory and response inter-relationship illustrates a pragmatic balance between the victim and the proximity of SAR resources. To improve SAR response time, SOLAS obliges all ships to provide assistance to other vessels in distress.[24] This obligation to provide mutual assistance is a risk mitigation consideration, which when taken collectively with the other SOLAS obligations, illustrates the inter-related approach an integrated SAR system could undertake to achieve both lifesaving as well as cost balance.

Finally, the Convention impresses on mariners to consider an assessment on potential dangers of their intended voyage, whether local or international.[25] Though this last point is not binding, statistically tracking such SAR cases identifies areas upon which to focus prevention efforts. Subsequent statistical measurement would determine the prevention effectiveness – again

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[22] Department of National Defence/Canadian Coast Guard, B-GA-209-001/FP-001-DFO 5449, *Canadian Aeronautical and Maritime Search and Rescue Manual,* (Ottawa: DND/CCG, 2014), 1.03, 1of 2.

[23] Treaty Series, *International Convention for the Safety of Life as Sea,* 1184, I-18961 (London: IMO, 1980), 373-382.

[24] Treaty Series, *International Convention for the Safety of Life as Sea ...,* 410.

[25] Bluebird Marine Systems Ltd. "SOLAS Latest - 2012 May SOLAS amendments," last accessed 12 December 2015, http://www.bluebird-lectric.net/SOLAS_international_convention_for_the_safety_of_life_ at_sea.htm.

important parts of an inter-related SAR system. Unnecessary use of resources is inefficient, but more importantly, response is no guarantee of survival.

International Maritime and Air SAR

Although the Convention for SOLAS laid the ground work for SAR, the adoption of the ICMSAR in 1979 established an international system covering marine search and rescue operations.[26] Though Canada already had many elements of a SAR program (some spurred by tragedy as will be shown in the historical overview), this Convention also encourages cooperation, pooling of facilities and common operating procedures. Like ICAO Annex 12, ICMSAR calls for establishment of a legal framework as well as the assignment of responsible authorities and processes to improve SAR service.[27]

The ICMSAR emphasizes the importance of close coordination between maritime and aeronautical SAR operations – something Canada accomplishes with its Joint Rescue Coordination Centres (JRCC) and close ties between the RCAF and the CCG at the tactical and operational level of SAR.[28] Although greater oversight of RCAF resources would be gained by the establishment of a single RCAF coordination centre, this would sever the close CCG/RCAF relationship at the JRCCs and erode public confidence.[29] This illustrates the intertwined

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[26] International Maritime Organization, "International Convention on Maritime Search and Rescue (SAR) Adoption: 27 April 1979," http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/ International-Convention-on-Maritime-Search-and-Rescue-(SAR).aspx. Note: adopted in 1979, but came into force in 1985.

[27] International Maritime Organization, *International Convention on Maritime Search and Rescue, 1979* (London: IMO, 2006), 9.

[28] *Ibid.,* 10.

[29] Julian Renaud, "Federal cutbacks force closure of Coast Guard bases - Halifax base will stay open and serve larger area," *Halifax Media Co-op*. 03 June 2013, last accessed 12 December 2015, http://halifax.mediacoop.ca/story/federal-cutbacks-force-closure-coast-guard-bases/17769; Kevin Grieve, "The Current Command and Control Structure for the RCAF's Aeronautical Search and Rescue: A Proper Enabler" (Joint Command and Staff Program Course Paper, Canadian Forces College, 2014), 15, 18. Note: the latter study examined different SAR control options and determined that the current JRCC structure of CCG/RCAF is one of the system's greatest strengths.

considerations of contemplated changes, especially to a pivotal part of the SAR system that is functioning well. A single department's self-interested attempt to streamline efficiency could ultimately be at the expense of the overall system's operational effectiveness.

From a strategy formulation perspective, these documents are the international *ends* or *objectives*. Two of the international conventions that govern SAR services note the requirement for a legal framework, as well as processes to improve SAR services and the designation of multiple resource options. The third document (SOLAS) provides for a pragmatic balance between self-reliance and response to ensure survivability until rescue arrives.

The manner by which the above conventions are operationally undertaken is contained in the IAMSAR manual. This joint International Maritime Organization (IMO) and ICAO publication proposes *ways* to meet the international *objectives*.[30]Advantage will be taken to show how integrated responsibilities, rather than stove-piped departmental responsibilities, better supports a national SAR system.

Benefits of Combined Services

The IAMSAR supports joint coordination centres within each search and rescue region (SRR) for both reasons of cost efficiency as well as development of better overall capabilities – this combination improves SAR service.[31] Though much attention was focused on the closing of the St. John's Maritime Rescue Sub-Centre in Newfoundland, the localized fears do not recognize other benefits of amalgamation into one JRCC located in Halifax nor the fact that as technology evolves, efficiencies can be realized to improve the sustainability of the national SAR

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[30] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual …,* iii.
[31] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual …,* 2-3.

system.[32] An overarching framework, with associated performance measurements and periodic gap analysis would provide scientific and independent evaluation of the actual situation. A closing justified by an unbiased report would avoid the appearance of politically motivated life-and-death decisions arising from the Centre's pending re-opening following the last federal election.[33]

IAMSAR asserts that a successful SAR organization can be achieved with multirole resources provided SAR managers simply initiate necessary agreements.[34] Like a JRCC, synergies and efficiencies can be realized by using SAR platforms for multiple roles, while prioritizing the lifesaving role. All federal vessels and aircraft are considered secondary SAR resources, but there is no pre-defined SAR coverage plan, so response is uncertain.[35] Because there is no plan, JRCC loses precious time requesting resources which may never become available. The *Royal Commission on the Ocean Ranger Marine Disaster* noted this shortcoming whereby JRCC was unable to quickly identify resources able to respond to the rapidly unfolding tragedy.[36]

Obviously, pre-designating and tracking all resources able to respond is the only way to assure (or even come close) to meeting the internationally recommended SAR on-scene arrival time of two hours.[37] A SAR resource is any designated unit, whether air, land or sea based, that

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[32] Sue Bailey, "Newfoundland calls on Ottawa to reopen rescue centre after Quebec centre spared," Canadian Press, in *Maclean's,* 19 December 2013, last accessed 12 December 2015, http://www.macleans. ca/general/ newfoundland-calls-on-ottawa-to-reopen-rescue-centre-after-quebec-centre-spared.

[33] "Liberals to reopen Maritime Rescue Sub-centre in St. John's," *CBC News*, last modified 13 November 2015, http://www.cbc.ca/news/canada/newfoundland-labrador/liberals-reopen-maritime-subcentre-1.3318053.

[34] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 1-3, 1-4.

[35] DND / CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual …,* 1.08, 1 of 3.

[36] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster, Report one: the loss of the semisubmersible drill rig Ocean Ranger and its crew* (St. John's: The Commission, 1984), 154.

[37] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 2-8, 6-6. Note: this is based upon a 30 minute response time and a 2 hour arrival time after JRCC alert.

quickly arrives on scene and provides initial aid.[38] An actively managed SAR system could dynamically position resources in areas of high risk (due to storms or seasonal activity), identify mutual assistance mitigation, or dictate survival requirements that match rescue times. The SAR system already manages some identified high risk activities such as seasonal fishery openings and summer recreational boating activity, but this is the extent of the management.[39] It is not part of a larger national analysis and (if necessary) pre-designated resource plan. The USCG uses a construct whereby organizers of marine activities must submit event requests and the subsequent event approval is contingent upon a balance of operator survival equipment and SAR response proximity.[40]

Multi-use could logically allow JRCCs to coordinate the air search portion of ground SAR cases. Though not a JRCC mandate, there is no reason not to support the ground search managers who do not have the same level of air search expertise.[41] Not only would this prevent publicized tragedies, such as SAR Makkovik, it would also avoid any loss of public confidence in the SAR system.[42] Confidence in the SAR system starts with its management and the coordination of essential elements to effectively run the system.

Communication

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[38] *Ibid.*, 2-8. Note: this is any initial aid, such as air droppable radios or equipment.

[39] Fisheries and Oceans, "Canadian Coast Guard's Inshore Rescue Boat Program," last modified 09 January 2013, http://www.dfo-mpo.gc.ca/media/back-fiche/2013/pac01a-eng.htm; Kathy Johnson, "Countdown to lobster season," *South Shore Breaker*, 24 November 2015, http://southshorebreaker.ca/ 2015/11/24/countdown-to-lobster-season/.

[40] United States Coast Guard, "Permitting of Regattas & Marine Parades," (March 2013): 1-7, 4-4, https://www.uscg.mil/directives/cim/16000-16999/CIM_16751_3.pdf.

[41] Emergency Management Office, *Standards and Operational Guide for Nova Scotia Ground Search and Rescue*, (June 2011): 8; Newfoundland and Labrador Volunteer Search and Rescue, "National Criteria for Ground Search and Rescue," last accessed 05 Apr 2016, http://www.nlsara.org/standards.html. Note: A Ground Search Manager is an experienced and qualified member who will normally direct individual ground resources.

[42] Alex Ballingal, "No search no rescue for Labrador's Burton Winter," *Maclean's,* 20 February 2012, http://www.macleans.ca/news/canada/no-search-no-rescue/.

An essential element of coordination is communication – between JRCCs and SAR units, and between SAR units themselves.[43] Though this seems obvious, without an integrated SAR system there have been numerous instances where air resources could not communicate with ground SAR personnel due the use of different radio bands. An overarching system would have foreseen this aspect in the planning process and supported either secondary radios or a dedicated ground-air SAR frequency. After much regional effort, in large part by volunteers, in 2011 Industry Canada allocated a SAR on-scene frequency for use by ground teams; this was still seven years after a working group formed to press the issue.[44]

JRCCs must also be able receive distress alerts.[45] Currently, Navigation Canada advises JRCC on overdue aircraft and the Canadian Mission Control Centre (CMCC) passes information regarding 406 MHz emergency locator beacons. Canadian Coast Guard (CCG) Marine Communications and Traffic Service (MCTS) Centres are the ears and voice of the maritime side of JRCC. In 2012-13 the Department of Fisheries and Oceans announced the closure of nine centres with the corresponding traffic areas consolidated into fewer, but larger centres; the latest to occur will be MCTS Comox in Spring 2016.[46] These closures caused local outcries and safety fears.[47] This was compounded when the rollout of the new consolidated centres experienced

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[43] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 2-1.

[44] National Search and Rescue Secretariat, "Working towards a common radio frequency," *SARSCENE* 14, no.2, (Summer/Fall 2004): 12, http://publications.gc.ca/collections/Collection/D91-1-14-2E.pdf; Industry Canada, "SAR-IF: The Search and Rescue Interagency Frequency Terms and Conditions: Access to Industry Canada's National Simplex VHF Channel (149.080 MHz) by the Search and Rescue Community," posted 22 August 2013, last accessed 12 December 2015, https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10622.html.

[45] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 2-2.

[46] Fisheries and Oceans Canada, "Notices to Mariners. Update to Consolidation of Marine Communications and Traffic Services Centres," last accessed 11 December 2015, http://www.notmar. gc.ca/go.php?doc=new/ marineconsolidation.

[47] Julian Renaud, "Federal cutbacks force closure of Coast Guard bases - Halifax base will stay open and serve larger area," *Halifax Media Co-op,* 03 June 2013, last accessed 12 December 2015, http://halifax.mediacoop.ca/story/federal-cutbacks-force-closure-coast-guard-bases/17769.

software problems that interrupted service.[48] As with the closure of the MRSC in St John's, an overarching framework would either allay the fears, or require the centres to stay open, but with the validity of an arms-length consideration and an added accountability for the ultimate impact to the SAR system.

SAR System Management and Support

Legislation should designate those agencies with SAR responsibilities and from those responsibilities flows the IAMSAR recommended planning processes, assessment of national needs and means to continuously improve SAR service.[49] To meet the associated management demands, a SAR Coordinating Committee (SCC) construct is recommended.[50] Canada's Interdepartmental Committee on Search and Rescue (ICSAR) has long met the intent of a SCC. In fact, the roots of ICSAR trace back to 1945, though it was re-affirmed in 1986 concurrent with the creation of the NSS and the Director of NSS as ICSAR's co-chair.[51] The ICSAR could be considered a whole of Government approach ahead of its time. Now, with the awakening realization of comprehensive approaches to conflict and relief, and the existence of other government agencies with emergency mandates, such as Public Safety, ICSAR's management role may need to be updated in order to ensure the national SAR system aligns with contemporary organizations.

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[48] CBC News, "Coast Guard software glitch leaves Arctic mariners in the cold – Software problems means rescue calls to Iqaluit may or may not be heard," last modified 15 July 2014, http://www.cbc.ca/ news/canada/ north/coast-guard-software-glitch-leaves-arctic-mariners-in-the-cold-1.2707211.

[49] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 1.5.2, 5.1.7, 5-2 to 5-13, 6-4 to 6-6.

[50] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual ...,* 1.5.6, J-1.

[51] GY Smith, *Seek and Save: The History of 103 Rescue Unit* (Erin: The Boston Mills Press, 1990), 11; DND/CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual* … 1.05 page 1of 2; Department of National Defence, "Reports on Plans and Priorities 2013-2014," last accessed 13 December 2015, http://www.forces.gc.ca/en/about-reports-pubs-report-plan-priorities/2013-other-national-search-rescue-secretariate.page.

Planning is essential for effectiveness and efficiency of mandates. The IAMSAR lays out a series of possible objectives and resources for the establishment of a national SAR system.[52] To ensure achievement of the SAR objectives, IAMSAR notes the requirement to conduct periodic SAR reviews, and from these SAR reviews establish a means to improve SAR service.[53] While Canada has a national SAR objective and multiple resources, what is missing are periodic review policies to drive the follow on processes to improve SAR service. A periodic review could be used to clearly substantiate such things as procurement proposals for the SAR system.[54]

The RCAF's Fixed-wing SAR (FWSAR) replacement project has languished since 2002 and been subjected to controversy that resulted in scrutiny by the Canadian Research Council and the Chief of Review Services.[55] Arguably, this would not have occurred had the procurement resulted from a national SAR review or gap analysis that clearly substantiated a nationally recognized SAR need, perhaps even northern SAR service needs.[56] The result is the impression that the RCAF simply wanted to replace an existing platform rather than meet IAMSAR's intent of exploiting technology to fulfill definable and emerging SAR needs.[57] Military historian and Canadian Defence Scientist Scott Robertson characterizes the RCAF's platform swapping approach as "we want what we want because we have what we have."[58] Not only is this approach contrary to the RCAF's doctrinal effects based approach to operations, but it allows industry to

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[52] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual …,* 5-2 to 5-13.

[53] *Ibid.,* 5.1.7, 6-4 to 6-6.

[54] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual …,* 5.1.7.

[55] Canadian American Strategic Review, *A Canadian Forces Fixed-Wing Search and Rescue Project Timeline,* Updated September 2015, last accessed 15 January 2016, http://www.casr.ca/id-fwsar-project-timeline.htm.

[56] CBC News North, "Canada's Arctic rescuers not based in North," last modified 01 November 2010, http://www.cbc.ca/news/canada/north/canada-s-arctic-rescuers-not-based-in-north-1.956604.

[57] IMO / ICAO, *International Aeronautical and Maritime Search and Rescue Manual …,* 6-4 to 6-6.

[58] Scot Robertson, "What Direction? The Future of Aerospace Power and the Canadian Air Force – Part 2," *Canadian Military Journal* 9, no. 1 (2009): 36, http://www.journal.forces.gc.ca/vo9/no1/06-robertson-eng.asp.

drive requirements and does nothing to counter editorials that are based on emotion and political spin versus fact.[59]

To counter misrepresentation and legitimately define needs, performance measurement is essential. However, such measurement requires a benchmark. Even with a national SAR objective, the missing framework of plans and policies to establish this benchmark was the gap identified in the 2013 Auditor General's report. An example of the subsequent disconnect that occurs without a national policy is provided by the different approaches taken by the CCG and the CAF regarding the SAR level of service performance measurement.

The CCG's stated level of service target allows 30 minutes for their primary SAR resources to respond.[60] Alternatively, the RCAF's stated target aims for an on-scene arrival time within four hours 90% of the time and 11 hours 100% of the time.[61] While both these approaches have merit, the following questions must be asked: why would the agencies have a different approach for a national SAR system; how do the responses address the internationally recommended on scene time of two hours; and what is the overall effectiveness of either posture? Measurement of the overall effectiveness is required to drive future analysis in order to meet the continuous improvement to SAR service envisioned by IAMSAR, while justification of the different departmental approaches is required for confidence and an aligned national SAR system. Alternatively, these differences could (conceivably) be justified by other identified air,

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[59] Canadian American Strategic Review, "Canadian Forces Fixed-Wing Search and Rescue (FWSAR) Project," Updated Mar 2015, last accessed 16 January 2016, http://www.casr.ca/bg-af-fwsar-project.htm; Pamela Wallin, "New SAR aircraft needed now," *Vanguard* (June/July 2011), last accessed 16 January 2016, http://www.vanguardcanada.com/2011/07/01/new-sar-aircraft-needed-now/.

[60] Canadian Coast Guard, "Maritime Search and Rescue in Canada," last accessed 19 January 2016, http://www.ccg-gcc.gc.ca/eng/CCG/SAR_Maritime_Sar.

[61] Campbell, L.C. Chief of the Air Staff, *Canadian Forces Search and Rescue Level of Service and Roles and Responsibilities* (National Defence Headquarters Ottawa: file 3010-6 (D Air FE)), 21 August 2002.

land, or sea resources that are registered and tracked if Canada had a pre-designated national SAR resource plan, as noted previously.

Conclusion

The precedence for a comprehensive and integrated approach to delivery of SAR services has a solid basis in international obligations and their accompanying standards and recommendations. This chapter highlighted some of the areas Canada aligns with those standards as well as gaps and discord that has arisen from a segmented and departmentalized approach to SAR delivery. Canada has joint JRCCs and strong cooperation between air and marine SAR units at the operational level. Canada also has many willing national resources available for SAR, but they are not all officially designated or tracked to assure rapid response. While Canada's ICSAR fulfills the SCC construct the actual coordination part is lacking; coordination that ensures national alignment through periodic reviews and processes to improve service. This results in fragmented levels of service, delayed procurements and slow exploitation of new technologies. From this departmentalized approach gaps in the SAR system emerge unobserved until realigned by a crisis.

Emotions can run high when it comes to SAR. Lives hang in the balance – and the system, as well as the responders, has a responsibility to plan and adapt to guarantee success. After all, SAR directly supports the government's responsibility to ensure the safety of its citizens.[62] Further, it is important to not only deliver an excellent SAR service, but *to be seen* as delivering an excellent service, in order to maintain confidence both internationally and nationally. Closing and re-opening CCG bases with different political parties makes valid

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[62] Privy Council Office, *Securing an Open Society: Canada's National Security Policy …*, vii.

decisions appear to be solely politically motivated and allowing citizens to perish for reasons of

poor coordination or awareness of available resources is simply tragic and unnecessary.[63]

The manner by which a country with similar SAR challenges manages its SAR system

may provide some practical examples on how to institute the practices espoused in international

agreements, standards and recommendations. Australia's SAR system is a good example, and

will therefore be the topic of the next chapter.

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[63] CBC News, *Liberals to reopen Maritime Rescue Sub-centre in St. John's*, last modified 13 November 2015, http://www.cbc.ca/news/canada/newfoundland-labrador/liberals-reopen-maritime-subcentre-1.3318053; "Vancouver's Kitsilano coast guard base to reopen 'as soon as possible' Announcement reverses unpopular 2013 decision to close busy base near downtown Vancouver," last modified 16 December 2015, http://www.cbc.ca/news/canada/british-columbia/kitsilano-coast-guard-announcement-1.3367750.

Chapter 2 – OPERATION AND MANAGEMENT OF AUSTRALIA'S SAR SYSTEM

Introduction

Examination of how another country conducts SAR provides insight into the strengths

and weaknesses of Canada's current SAR system and the subsequent requirement for a

multipurpose, cross-jurisdictional approach. To compare Canada's SAR challenges to a

landlocked country, or even to a country with a high population density but a relatively small

SRR, would not result in relevant comparisons when it comes to evaluating a country's ability to

exercise SAR *reach*.[64] Therefore, lessons learned from Australia will unveil incremental ways to

optimize Canada's SAR system.

Australia as a Basis for Comparison

Australia is an ideal choice because it is a comparative country in terms of capacity,

cultural mindset and geographical challenges. Canada and Australia see themselves as middle

powers, and both are members of the modern Commonwealth, with historical associations to the

United Kingdom.[65] This is relevant because of the "core Commonwealth principles of consensus

and common action, mutual respect, inclusiveness, transparency, accountability, legitimacy, and

responsiveness."[66] The role that a civil society is expected to play in the provision of a lifesaving

service is relevant when it comes to the determination of a country's SAR system and its unity of

purpose. Indeed, Australia's system of government has similarities to Canada's that allow

parallels to be made in terms of examining coordination and cooperation. For example, Australia

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[64] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors ...*, 39-40. Reach, defined from an air force perspective relates to the ability to rapidly project power in support of missions of national interests including the capability to satisfy SAR obligations far offshore.

[65] Aaron P. Jackson, *Doctrine, strategy and military culture: military-strategic doctrine development in Australia, Canada and New Zealand, 1987-2007* (Ottawa: National Defence, 2013), 9-10; Global Affairs Canada, "Canada and the Commonwealth," last modified 05 November 2015, http://www.international.gc.ca/commonwealth/index.aspx?lang=eng.

[66] The Commonwealth, "Our Charter," last accessed 02 February 2016, http://thecommonwealth.org/ our-charter.

is comprised of states and territories, each with a degree of independence, individual powers and

resources separate from central governance.[67] On balance, as military affairs author Aaron

Jackson notes, the countries have more in common with each other than they have differences.[68]

Looking at the geographical challenge, the respective SAR SRRs provide a reasonable

comparison. Canada is internationally responsible for over 18 million km^2 of land and sea, while

Australia's SRR is almost 52.8 million km^2.[69] Though at first glance this may seem like a huge

disparity for a comparison, a large portion of Australia's area of responsibility is over water and

stretches to the Antarctic (Figure 2.0) where there is limited traffic.[70] SAR response operations

for incidents that occur in the Southern Ocean and Antarctic thus pose similar challenges as

Canada faces with regards to the Arctic. Currently, Australia places emphasis on an Antarctic

expedition's self-reliance.[71] The bulk of Australia's commercial and domestic air traffic is

northwards to Southeast Asia and North America, with lesser traffic to South America and

Africa. Large vessel traffic is likewise either coastal or steaming towards Southeast Asia.[72]

Finally, in terms of SAR case load, the SRR handles approximately 10,000 cases per year, which

is comparable to the combined total of Canada's three JRCCs.[73]

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[67] Government of Australia, "How Government Works," last accessed 02 February 2016. http://www.australia.gov.au/about-government/how-government-works.

[68] Aaron P. Jackson, *Doctrine, strategy and military culture …*, 17.

[69] National Defence, "Search and Rescue in Canada," last modified 26 November 2014, http://www.forces. gc.ca/en/operations-canada-north-america-current/sar-canada.page; Australian Maritime Safety Authority, *National Search and Rescue Manual 2014* (Canberra: Australian Maritime Safety Authority, 2014), 1, https://natsar.amsa.gov.au/natsar-manual.asp.

[70] Australian Maritime Safety Authority, *Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters submission 9* (June 2014), 5.

[71] *Ibid.*, 7.

[72] ICAO, "International & Domestic TRAFFIC FLOW 2012," last accessed 02 February 2016, http://www.arcgis.com/home/webmap/viewer.html?webmap=abe4516f02af466db1f7c6376d485b85; Vessel Finder, last accessed 02 February 2016, https://www.vesselfinder.com/.

[73] Australian Maritime Safety Authority, "Emergency Response Centre Fact Sheet," last accessed 02 February 2016, https://www.amsa.gov.au/forms-and-publications/Fact-Sheets/ERC_Fact.pdf; Sarah Hughes, e-mail message to author, 27 January 2016. Note: Hughes statistics sourced from the SAR Mission Management System via the Systeme d'"Information SAR.

Figure 2.0 – Map of Australian SRR
Source: Australian Maritime Safety Agency, *Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters submission 9* (June 2014), 8, fig., 1.

Originally, each state or territory in Australia practiced SAR by using whatever resources were available. It was not until 1976 that the different responders moved towards unification and held a national conference from which emerged the National SAR Council.[74] Despite the fact that Australia became a signatory state to ICAO in 1947, it was initially a slow evolution towards the current inclusive, shared and integrated approach to SAR delivery (described below).[75] As a Crew Chief from the State of New South Wales summarized, the current system is founded on past experience and a multilayered SAR approach that just "seems to work."[76]

National SAR Council

As a result of an Intergovernmental SAR Agreement (IGA) first signed in 2004 and updated in 2012, the aforementioned National SAR Council became responsible for the national

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[74] Jim Whitehead, "Search and rescue in Australia," *Australian Journal of Emergency Management* 30, no. 1, (2015): 44, https://ajem.infoservices.com.au/items/AJEM-30-01-13#sthash.lU3psHkD.dpuf.

[75] Department of Infrastructure and Regional Development, *Australia and Global Aviation*, https://infrastructure.gov.au/aviation/international/icao/files/icao_assembly_brochure_jan2014.pdf.

[76] Roger Fry, "Australian SAR System," e-mail to author, 27 December 2015. Note: Roger Fry is a Crew Chief/Logistics Manager with the Westpac Life Saver Rescue Helicopter in northern New South Wales.

management of SAR and the coordination and cooperation of the numerous SAR authorities.[77]

As the Chairman of the SAR Council notes, "all SAR authorities in Australia: Australian

Maritime Safety Authority (AMSA), Australian Defence Force (ADF) and State, Territory and

Federal Police must be able to act cooperatively."[78] However, aside from the good intent of

active cooperation, the IGA, which is signed by all the SAR authorities, provides detailed

acceptance of prescribed responsibilities. Highlights of these responsibilities undertaken are

commitment to provide resources for their respective locations; acceptance of funding

arrangements; commitment to follow the standards prescribed by the SAR Council; and

acceptance of primary jurisdiction for certain types of SAR operations.[79]

The National SAR Council notes the importance of following agreed upon standardized

procedures, as laid out in the National SAR Manual, to ensure mutual coordination and best

results in the effort to save lives.[80] Canada has the equivalent of the Australian National SAR

Manual, the Canadian Aeronautical and Maritime Search and Rescue manual (CAMSAR), but as

the Australian system extends beyond the federal level their manual gains greater importance.

For example, as will be described shortly, the state police (Australia does not have a Coast

Guard) are responsible for coastal marine SAR.

The National SAR Council meets at least annually, requires a majority of members to

attend and encourages representatives from respective SAR authorities to present new

procedures that could benefit the wider SAR community.[81] They also produce a strategic outlook

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[77] Jim Whitehead, "Search and rescue in Australia," …, 44.
[78] Australian Maritime Safety Authority, *National Search and Rescue Manual* …, 1.
[79] Australian Maritime Safety Authority, *Inter-governmental Agreement on National Search and Rescue Response Arrangements (*29 June 2012), 2-7, https://natsar.amsa.gov.au/ documents/ IGA29June2012.pdf.
[80] Australian Maritime Safety Authority, *National Search and Rescue Manual* …, 1.
[81] Australian Maritime Safety Authority, *Inter-governmental Agreement on National Search and Rescue* …, 6; Australian Maritime Safety Authority, *National Search and Rescue Manual* …, 2.

document expressing current and anticipated challenges for the SAR system, along with the

intended mitigation activities to address those challenges. This outlook document started in 2012,

developed by a working group from within the Council and is now tabled annually for adoption

by Council members.[82] In 2013 the outlook's target horizon was extended out five years to

allow time for future initiatives to establish outside support if required.[83] As a mechanism to

broadly disseminate SAR Council activities, the most recent (October 2015) annual council

meeting proposed an annual SAR Council Performance Report. This report would be sent to all

state and territorial police commissioners to provide awareness of the Council's achievements

against the strategic outlook.[84] Arguably, this would be a fair way to ensure that all senior

officials of respective departments involved in the delivery of SAR services could gain visibility

into operations within their purview, visibility into performance outside their purview, as well as

visibility into the performance of the whole program.

Of interest is that many of the planned mitigation strategies in the original 2012-2015

strategic outlook simply involved promotion of common tools, standardized practices,

information sharing, and interoperability.[85] This is both a relatively low-cost solution as well as

reflective of an Edge Organization, an approach to complex organizational systems offered by

well-published scholars and researchers David Alberts and Richard Hayes.[86] The social

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[82] Australian Maritime Safety Authority, National Search and Rescue Council, *36th National Search and Rescue Council meeting* (16-18 October 2012), 27, https://natsar.amsa.gov.au/documents/2012rep.pdf.

[83] Australian Maritime Safety Authority, National Search and Rescue Council, *37th National Search and Rescue Council meeting report* (6-8 November 2013), 11, https://natsar.amsa.gov.au/documents/ 2013rep.pdf.

[84] Australian Maritime Safety Authority, National Search and Rescue Council, *Thirty-ninth National Search and Rescue Council meeting* (14-16 October 2015), 18; Australian Maritime Safety Authority, National Search and Rescue Council, "Council Reports," last accessed 09 March 2016, https://natsar.amsa.gov.au/council-reports.asp. Note: as of 09 March 2016 these papers were not yet posted on the Council's website.

[85] Australian Maritime Safety Authority, National SAR Council, *Strategic Outlook 2012-2015*, 5. https://natsar.amsa.gov.au/publications.asp#Strategic-Outlook.

[86] David Alberts and Richard Hayes, *Power to the Edge: Command, Control in the Information Age* (Washington, DC: CCRP Publication Series, 2004), 91-92,175-177. Power to the Edge focuses on information and awareness sharing as well as the requirement to collaborate effectively and synchronize actions.

(interoperability), informational, and physical (standardization) components empower individuals to "get things done."[87] Also of note is the Australian SAR Council's intention to adopt "a risk-based response to vulnerable areas."[88] This aspect of knowledge sharing and risk-based approach will be explored in more depth when offering possible approaches for Canada's SAR framework. For all the collaborative effects and work of the SAR Council, however, it is not the actual Australian SAR Authority.

Australian Maritime Safety Authority

The AMSA was established under the *Australian Maritime Safety Authority Act 1990* and it is the Australian SAR authority. Thus, AMSA is responsible to ensure that the provision of SAR services meets international obligations under ICAO, SOLAS, and the SAR Convention. The AMSA also holds positions as both the Chair and Secretariat of the SAR Council. However, AMSA is responsible for more than SAR – it is also the maritime safety and environmental protection authority.[89] Although the focus for this chapter is on the SAR role, it is also worth mentioning that there are oversight advantages of having both the marine regulatory agency and the SAR provider under the same budget and management.

AMSA also chairs the Australian Search and Rescue Consultative Forum. This Forum meets semi-annually, and is comprised of representatives from organizations that might reasonably be expected to either require or contribute to SAR. A sampling of stakeholders includes heads of the Aircraft Owners and Pilots Association, the Air Transport Association,

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[87] Dana Gavrieli and Richard Scott, "Intercultural knowledge flows in edge organizations: Trust as an enabler," (Stanford University: California 2005), 4, https://gpc.stanford.edu/sites/default/files/wp019_0.pdf.

[88] Australian Maritime Safety Authority, National SAR Council, *Strategic Outlook …*, 5.

[89] Australian Maritime Safety Authority, *Inter-governmental Agreement on National Search and Rescue ...*, 4-5; Australian Maritime Safety Authority, *Corporate Plan 2015-2019* (Canberra: Australian Maritime Safety Authority, June 2015), 3, http://amsa.gov.au/forms-and-publications/about-amsa/publications/Corporate-Plans/AMSA-Corporate-Plan-2015-19.pdf.

Yachting Association, and Shipping associations. This Forum fulfills routine stakeholder engagement, feeding industry concerns through AMSA to bring to the broader representatives of authorities on the SAR Council.[90]

JRCC Authority

At the operational level, coordination of life saving SAR service is done through only one JRCC, co-located with AMSA's Head Office, in Canberra. Like Canada's JRCCs, it operates 24 hours a day as the SAR agency for maritime and aviation search and rescue operations. Although the Australian JRCC coordinates SAR for all distress beacons and registered aircraft related emergencies, off shore marine cases are more nuanced.[91] As noted previously, there are times when coastal maritime SAR operations are the responsibility of the state police. The SAR manual terms this as the responsible authority "best placed" to respond.[92] Maritime capability of the police services varies greatly between states or territories, so there is no nationally defined distance from shore.[93] If "best placed" is not obvious, then the responsible authority is determined by mutual agreement.[94]

When the JRCC remains the responsible authority, it turns to a database of specialist SAR agencies that lists commercial companies, state or territorial assets, or other federal departments to carry out the SAR operation.[95] This database allows Australia to meet SAR obligations, as suggested by IAMSAR, using very limited dedicated SAR resources, as the

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[90] Australian Maritime Safety Authority, "Policy and Forums: Shaping the future of search and rescue in Australia," last accessed 02 February 2016, https://www.amsa.gov.au/search-and-rescue/sar-in-australia/policy-and-forums/.

[91] Australian Maritime Safety Authority, *Aviation Search and Rescue* (Canberra: Australian Maritime Safety Authority, n.d.), 9, 11, https://www.amsa.gov.au/forms-and-publications/search-and-rescue/publications/.

[92] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 31-32.

[93] Dave Bacchus, "Australian SAR System," e-mail to author, 30 Nov 2015. Note: Dave Bacchus is an officer with the Water Operations Unit, South Australia Police.

[94] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 31.

[95] *Ibid*., 6.

aircraft, marine craft and land facilities are "normally used for other purposes but [they] can be made available to form part of the SAR effort." The air assets are broken down into levels of capability, called "Tiers" of one to four. The asset that is selected is the one that is most appropriate for the needs of the situation.[96]

Air Resources

Though dedicated SAR assets are few, they are not non-existent. Australia currently has five full time (Tier 1) commercially contracted Dornier 328 turboprop fixed-wing aircraft distributed at five locations along the coastline. These aircraft have a robust communications suite, specialized search sensors (radar, FLIR, UV/IR) and airdropable life rafts, SAR datum marker buoys, radios and de-watering pumps.[97] Arguably, $200 million commercial contracts are never without controversy, and the current company, Paspaley Group, made political donations. The contract is about to change hands. In August 2016, Cobham Aviation, an international commercial helicopter and fixed-wing SAR services provider will take over the contract with the Bombardier Challenger CL-604 jet aircraft. The new contract is valued at $700 million and will be based out of only three locations.[98] When not being used for SAR, the aircraft are available for use by other government agencies for emergency response or maritime surveillance.[99]

The elapsed response time to a distress situation can be the sum of both the JRCC tasking time and the Tier 1 response. Both the current and future contracted aircraft response times are

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[96] Australian Maritime Safety Authority, *National Search and Rescue Manual …,* 49, 181-183, 305. Quote from page 49.

[97] Australian Maritime Safety Authority, *National Search and Rescue Manual …,* 305.

[98] Cobham Aviation Services, "Search and Rescue," last accessed 03 February 2016, http://www.cobhamaviationservices.com/what-we-do/search-rescue/; Gary Hughes, "Air rescue group gave to Coalition," *Australian,* 22 January 2008, http://www.theaustralian. com.au/news/nation/air-rescue-group-gave-to-coalition/story-e6frg6nf-1111115369157; Ed Gent, "Cobham wins Australian airborne search and rescue contract," *Engineering and Technology,* 24 October 2014, http://eandt.theiet.org/news/ 2014/oct/cobham-australia.cfm.

[99] Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 125, https://natsar.amsa.gov.au/ documents/ 38natsar-council-papers.pdf.

30 minutes during the day and 60 minutes at night.[100] The 12 hour night shift requires the crew to

be at the hangar in 30 minutes and calling for taxi clearance 60 minutes after JRCC activation.

Further, the JRCC target time to initiate a response is to task a resource within 30 minutes of

distress notification. When this measure of performance cannot be met, the JRCC duty

coordinator must advise the JRCC Chief; on average the JRCC response was 27 minutes in

2015.[101] These measures of performance are relevant, because they are the only response targets

within the Australian system. The other resources, as will be shown, are on an "as available"

basis.

Tier 2 resources are always helicopters that are concurrently contracted to provide

Emergency Medical Services (EMS), police, or police SAR services to a state or territorial

government.[102] This makes sense from a cost point of view because the resource is already

funded. It makes sense from a capability point of view because it is already crewed with trained

SAR crews or necessary medical personnel. As with maritime resources, the type of helicopter

capability varies greatly from one region to another, dependent upon funding and requirements.

Some of these EMS helicopters have a rescue hoist capability, and go well offshore to conduct

medevacs at sea. Prior to a Tier 2 helicopter assisting with a SAR mission, coordination is often

required with the state Ambulance Coordination Centre.[103]

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[100] Paspaley Group, "AeroRescue," http://paspaleygroup.com/aviation/aerorescue; Cobham Aviation Services, "Search and Rescue Roles," last accessed 06 February 2016, http://www.cobhamaviationservices. com/careers/roles/amsa-roles.

[101] Australian Maritime Safety Authority, *Annual Report 2014-15* (Canberra: Australian Maritime Safety Authority, 2015), 135, http://www.amsa.gov.au/forms-and-publications/about-amsa/publications/ Annual-Reports/2014-2015/page-contents/full-report.pdf; Scott Constable, "Updated Questions," e-mail to author, 10 February 2016. Note: Scott Constable is a JRCC Chief.

[102] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 305.

[103] Roger Fry, "Australian SAR System," e-mail to author, 27 December 2015; Government of Western Australia, Department of Fire and Emergency Services, "RAC Rescue at Sea," *24seven magazine* 2 (2012): 11, last accessed 09 April 2016, http://www.dfes.wa.gov.au/aboutus/operationalinformation/ helicoptersandaircraft/RACPublications/FESA-RAC_Rescue_all_at_sea.pdf.

An interesting difference between the Tier 2 and Tier 1 resources is funding. Financial support for helicopters, which are often shared between EMS and Police,[104] is generally provided through a blend of state and sponsorship money. The helicopter service then generally paints the sponsors' names on the aircraft, and adopts the name of the major sponsor, such as the Royal Automobile Club (RAC) in Western Australia or the service from New South Wales named Westpac after the local bank. This funding ensures that, in accordance with the IGA, users of the service are not to be charged.[105]

Tier 3 resources are also always helicopters, except they are already providing concurrent contracted SAR services to a commercial company, such as the offshore oil and gas industry. These companies promote use of their offshore helicopters by AMSA for regional medevac or SAR needs when they are not required for oil and gas activities.[106] When Tier 3 resources are used, AMSA pays the charter cost for use of the asset. The remaining level of Tier 4 are other fixed-wing state resources that can be used for basic visual search or beacon homing tasks.[107] Given that JRCC has dedicated fixed-wing assets with SAR mission suites, there is likely minimal need for other than these two baseline SAR capabilities.

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[104] Dave Bacchus, "Australian SAR System," e-mail to author, 30 Nov 2015.

[105] Government of Western Australia, Department of Fire and Emergency Services, "RAC Rescue Helicopter," last accessed 02 February 2016, http://www.dfes.wa.gov.au/aboutus/operationalinformation/ helicoptersandaircraft/Pages/racrescuehelicopter.aspx; Westpac Helicopter Service, "Saving Lives Since 1975," last accessed 02 February 2016, http://www.rescuehelicopter.com.au/Partners/Naming_Rights_ Sponsor; Australian Maritime Safety Authority, *Inter-governmental Agreement on National Search and Rescue …*, 7.

[106] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 305; Heather Couthaud, "Australian SAR operations get a boost from oil and gas industry," *Airbus Helicopters,* last accessed 09 April 2016, https://www.airbushelicopters.com/website/en/ref/Australian-SAR-operations-get-a-boost-from-oil-and-gas-industry_242.html; CHC Helicopters, "SHELL ANNOUNCEMENT: Shell Launches Landmark Search and Rescue Service in Broome," last modified 07 July 2014, http://www.chc.ca/news/2014/07/shell-launches-landmark-search-and-rescue-service-in-broome.aspx.

[107] Scott Constable, "Updated Questions," e-mail to author, 10 February 2016; Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 305.

Therefore, except for the contracted Tier 1 fixed-wing assets, there is no set response timeline. Instead, response is dependent upon availability.[108] Because of this uncertainty, JRCC has yet another defined option in its layered SAR response construct. With the understanding that the type of resource required is necessarily situation dependent, when no state assets are available JRCC first considers general commercial aviation operators before the other federal resources such as Customs or Australian Defence Force aircraft.[109]

For this reason, the JRCC maintains a list of commercial aviation operators that formally submit applications to be used for SAR incidents. They are listed by helicopter and fixed-wing categories and divided into those trained and equipped for SAR and those that could only be used for other miscellaneous tasks such as transport or logistics.[110] Canada has something similar, in the sense that JRCC tasks commercial helicopters that are listed on the Public Works and Government Services Standing Offers website, but this site simply lists the company's office location.[111] Having a company push the application to the JRCC along with their qualifications and geographical working location (such as a seasonal exploration company making their air assets available for tasking) would provide the JRCC with timely situational awareness of useful SAR assets within a geographical region. While this may seem redundant, one never knows when an emergency will arise. The Royal Commission on the Ocean Ranger Disaster was critical of JRCC Halifax for not knowing what commercial air and marine resources were in the area that

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[108] Roger Fry, "Australian SAR System," e-mail to author, 27 December 2015; Dave Bacchus, "Australian SAR System," e-mail to author, 30 Nov 2015.

[109] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 181.

[110] *Ibid.,* 306.

[111] Public Works and Government Services Canada, "BuyandSell.gc.ca," last modified 08 December 2015, https://buyandsell.gc.ca/goods-and-services.

could be called upon to respond to the unfolding disaster. The unfortunate result was that all 84 men on board perished off the coast of Newfoundland.[112]

When commercial resources are not appropriate, another source of resources specifically designated in the SAR Manual are the customs aircraft.[113] This service was formerly called the Customs Coastwatch, but the entire organization of customs, immigration, and border protection construct was merged in July 2015 to become the Australian Border Force.[114] Their complement of commercially contracted fixed-wing and helicopter resources are dispersed to address regional surveillance needs, but an open source plane spotting website shows most are located along the northern coastline. The Border Force's area of operations and fleet size makes up the "world's largest aerial civil maritime surveillance operation."[115] At first glance, since they are government contracted assets, there is what appears to be an obvious synergy of employing these resources for SAR. In fact in 2001, a federal government committee studied whether the, then-named, Coastwatch program should merge with Australia SAR. However, the study determined that statistically it was most effective to simply task a Coastwatch asset if required given that the remote Coastwatch operating areas resulted in only 5.6% hours flown on SAR operations. Given the lack of overlap, the two operations remained separate.[116]

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[112] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster. Report one: the loss of the …*, iii, 154, 155.

[113] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 185.

[114] From Federation to Australian Border Force, last accessed 02 February 2016, http://australiancustomshistory.com.au/#!period-2010s.

[115] Capricorn Plane Spotting, "Surveillance / Customs Australia," last accessed 03 February 2016, http://www.capricornplanespotting.com/256995792; Defense Industry Daily, "Australia's Coastwatch: A Public-Private Model for Coast Guards and CBP," last modified 31 October 2012, http://www.defenseindustrydaily.com/cobham-catches-a-1b-australian-coastwatch-contract-01695/.

[116] House of Representatives, Joint Committee of Public Accounts and Audit, *Review of Coastwatch* (22 August 2001), 124-126, http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_ Representatives_ committees?url=jcpaa/coastwatch/contents.htm.

Though the operations remained separate, the Border Force is within JRCC tasking lines and the National SAR Manual defines the process to request their assistance. Whenever an offshore incident occurs, JRCC liaises directly with the Border Force Command Centre to request use of the Border Force aircraft or vessel for SAR purposes. Once provided, the JRCC tasks the commercial resource directly, like any other charter."[117]

A similar situation of possible overlap between surveillance and SAR exists off the coasts of Canada with either the Fisheries and Oceans Canada contracted patrol aircraft or the Transport Canada / Environment Canada National Aerial Surveillance Program aircraft.[118] Although JRCC Halifax and Victoria receive the aircraft's patrol area, a specific request and tasking process is not described in the CAMSAR should the aircraft be needed after regular patrol hours. The CAMSAR only states that "aircraft, vessels and other facilities of all departments of the federal government are considered secondary search and rescue (SAR) units and will respond to taskings or calls for SAR assistance whenever possible."[119] This statement works well as a resource of opportunity, but the definition lacks clarity as a process or framework for deliberate access, and will inevitably result in slower than ideal response as respective operation centres and authorities figure out how to handle such an ad hoc request. An equally important factor is SAR training as a designated SAR resource. Further, two-way education between secondary units and JRCCs regarding capabilities and requirements as well as mechanisms to put search spotters on board is also required. Without verification of a search resource's qualifications, JRCC cannot confidently, or even legally, accept their search results as other than supplementary.

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[117] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 185; Scott Constable, "Updated Questions," e-mail to author, 03 February 2016.

[118] Fisheries and Oceans Canada, "Fisheries and Oceans Canada Air Surveillance Program," last modified 04 June 2009, http://www.dfo-mpo.gc.ca/international/media/bk_air-surveillance-aerien-eng.htm; Transport Canada, "Spill Prevention: National Aerial Surveillance Program," last modified 28 September 2015, https://www.tc.gc.ca/eng/marinesafety/oep-ers-nasp-2195.htm.

[119] DND / CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual …*, 1.08, 1 of 3.

Australian Defence Force

Finally, although not primary resources for civilian SAR, the assistance of ADF assets can be requested. The SAR Manual notes that the tier levels should be used with "due regard to responsiveness and availability," with overriding consideration given to a SAR unit's capability to conduct the particular SAR mission.[120] Thus, even though listed as the final resource, the ADF's assistance is very much dependent upon the situation; if there is no equivalent civilian capability then JRCC immediately requests military assistance.[121] The ADF's Royal Australian Air Force (RAAF) maintains one C130 Hercules or one AP3C Orion (similar to Canada's CP140 Aurora) aircraft on standby for military SAR response. RAAF assistance is provided through Australia's Headquarters Joint Operations Command (HQJOC), but as this is not a dedicated civilian SAR resource there is no guaranteed response time for this aircraft, and the time ranges from three to 12 hours.[122]

Once a SAR resource was available, JRCC would coordinate the aircraft's SAR mission, while operational control remained with the HQJOC.[123] This is an extra consideration than what Canada experiences. Canada's JRCCs have a military Commander and operational control of secondary as well as primary RCAF assets is regularly assigned to the SRR Commander via message from the RCAF's Combined Air Operations Centre.[124]

Both the Hercules and the Orion are able to drop Survival Kits consisting of two life rafts and marine supply containers but, unlike Canada, the RAAF do not have the equivalent of SAR

[120] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 181.

[121] Scott Constable, "Updated Questions," e-mail to author, 03 February 2016.

[122] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 184; Royal Australian Air Force, "Got them spotted," *Air Force News,* last modified January 2002, http://www.defence.gov.au/news/raafnews/editions/4401/story01.htm.

[123] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 185.

[124] Department of National Defence, *Canadian Joint Operations Command SAR Directive 01-2014,* (Canadian Joint Operations Command: file 3385-1/RDIMS 344377, April 2014), 3, 9.

Technicians who can attend distress situations by parachute insertion.[125] Perhaps to offset this,

they have an interesting airdropable kit called a heli-box. As shown in Figure 2.0, a heli-box is

an expendable container with a rotor-like fold-out that, once dropped, autorotates down to the

target. Canada delivers containers under small parachutes, but the disposable heli-boxes are less

affected by wind so are purportedly very accurate, an important factor when SAR is not a

primary duty.[126]

Figure 2.1 – Heli-box
Source: Google Search - Australia heli-box picture.[127]

State or Territorial SAR Authority

As noted previously, AMSA, through its JRCC is responsible for registered civil aircraft

and some marine cases at sea. All other SAR cases – lost persons, non-registered aircraft and

some cases of persons on or from a vessel at sea – are the responsibility of the state or territorial

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[125] Ianto Smith, Sqn Leader, Royal Australian Air Force Officer, JCSP 42 student, 30 November 2015, with permission.

[126] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 309; Douglas S. Ritter & Equipped To Survive Foundation, Inc. "Search and Rescue Conference 2001 Asia-Pacific Regional," last accessed 05 February 2016, http://www.equipped.org/aprsarconf_01.htm.

[127] Heli-box picture, note AMSA marking on side of box, best picture from internet. "Images for helibox," Google search, last accessed 25 April 2016,
https://www.google.ca/imgres?imgurl=http%3A%2F%2Fwww.combatreform.org%2FHELIBOX1.jpg&imgrefurl=http%3A%2F%2Fwww.combatreform.org%2Fabnlogistics.htm&docid=o4PpFf6Iuf0M4M&tbnid=I6NHbNdColYQ2M%3A&w=435&h=383&safe=active&bih=519&biw=1138&ved=0ahUKEwj1zdW1tK3MAhVGsYMKHWl5CJwQxiAIAg&iact=c&ictx=1.

authority (police) of the specific jurisdiction.[128] Except for a vessel at sea scenario, the

delineation is clear.

As the marine SAR milieu falls under the authority of "best placed" to respond, it is very

much dependent upon the resources within a given state or territory. The states along the east

coast, where most of the population lives, experience a great deal of marine SAR activity and

consequently the states of New South Wales (NSW), Victoria, and Queensland have large water

police bases.[129] For example, the Queensland Water Police have three 25 metre long

Catamarans, capable of speeds in excess of 25 knots; they also handled 931 marine cases in

2014.[130] The South Australia Police, by comparison, only have one offshore vessel offset by 245

marine cases in 2014, up from only 176 in 2013.[131] Because of this variability, the responsible

authority for marine cases is coordinated on a case-by-case basis with AMSA. Perhaps due to its

maritime focus, Australia has no shortage of volunteers to help the state police with their tasks.

Although there is no volunteer civilian air search and rescue, there is an extensive

network of volunteer marine search and rescue units. The State of Queensland alone has 25

volunteer units.[132] As stated in the National SAR Manual, all volunteer activity falls under the

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[128] Australian Maritime Safety Authority, *Inter-governmental Agreement on National Search and Rescue* …, 3, 6.
[129] Australian Maritime Safety Authority, National Search and Rescue Council, *37th National Search and Rescue Council Papers,* (6-8 November 2013), 101.
[130] Mike Brown, "'32011QB': Queensland Police Patrol Boats Outstanding ABA patrol boats replace Queensland Police Fleet," *P & W Marine Engineers*, last accessed 05 February 2016, http://www.pwmarine.com.au/32011qb-queensland-police-patrol-boats/page/151/; Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 9.
[131] Dave Bacchus, "Australian SAR System," e-mail to author, 30 Nov 2015; Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 57.
[132] Volunteer Marine Rescue Association Queensland, last accessed 05 February 2016, http://marinerescueqld.org.au/.

state police; consequently, they are the approval authority for volunteer organizations.[133]

Volunteer enthusiasm became so prolific in some states that the independent volunteer agencies

began to compete with each other for funding and personnel to the point that overall marine SAR

service degraded. One state, NSW, conducted a governmental review with the resultant

recommendation that the independent volunteer groups dissolve and form one state volunteer

marine service.[134] As of January 2010, the single, official state marine rescue service became the

Marine Rescue NSW.[135] This region was not alone with this challenge. The Government of

Western Australia (WA) faced the same problem and is currently "working towards the

amalgamation of all volunteer marine rescue groups in WA under one authority."[136]

In 2010, following a National SAR Council working group recommendation, a "National

Volunteer Marine Search and Rescue Committee (NVMSARC) was established to provide a

consultative forum for agencies involved in volunteer marine rescue." The Chair of the

NVMSARC attends the SAR Council meetings and provides an annual report on the health and

challenges of the volunteer marine SAR community.[137] Such an arrangement both manages and

recognizes the valuable SAR volunteers.

Thus, much like the Australian states and territories moved towards unification in 1976,

having realized the benefit of working together towards a common vision, now the individual

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[133] Australian Maritime Safety Authority, *National Search and Rescue Manual* …, 30; Government of Western Australia, Department of Fire and Emergency Services, "Volunteer Marine Rescue Services," last accessed 05 February 2016, http://www.dfes.wa.gov.au/aboutus/operationalinformation/Pages/volunteermarinerescueservices.aspx.

[134] Government of Victoria, *Volunteer Marine Rescue: Review of the structure, adequacy and long term viability of New South Wales Volunteer Marine Rescue Organisations. A report for the Hon Joseph Tripodi MP Minister for Ports and Waterways. Facilitator - Hon John C Price - July 2008* (N.p.: n.p., 2008), 3, 17-18.

[135] Marine Rescue NSW, "About Marine Rescue NSW," last accessed 06 February 2016, http://www.marinerescuensw.com.au/about-us.

[136] Australian Maritime Safety Authority, National Search and Rescue Council, *36th National Search and Rescue Council* (16-18 October 2012), 7, https://natsar.amsa.gov.au/documents/2012rep.pdf.

[137] Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 110,113.

states are improving their SAR service by unifying marine volunteer groups. In the Victoria (BC,

Canada) SRR, a similar situation is developing, where there are enthusiastic and well-intentioned

volunteer marine SAR groups such as the Canadian Lifeboat Institute and the Canadian Coast

Guard Auxiliary, named the Royal Canadian Marine SAR.[138] Because the organizations are

volunteer based, they cannot be expected to be available 24/7, but it is arguable that a national

vision might focus the enthusiasm and dedication of these members to provide best regional SAR

response versus competing organizationally, such as occurred in NSW.

JRCC Assistance to a Another Authority

Even when the AMSA JRCC is not the responsible authority, the centre is still available

to provide subject matter expertise and assistance either in the form of advice on how to

prosecute the SAR operation, or in the selection of suitable aircraft most appropriate for the SAR

operation. This is regardless of whether it is a marine, an unregistered aircraft, or a land SAR

case. Although JRCC cannot become the authority for a land search, if requested by the

responsible authority, the JRCC will take over responsibility for planning, coordinating and

conducting the air search.[139] Such a collaborative arrangement does not currently exist in

Canada. Though land searches are often confined to a smaller geographical area than air or

marine searches, there are occasions where trained airborne searchers and appropriate air search

patterns could be beneficial.[140]

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[138] Note: Author's observation based upon 20 year's SAR experience, most recently as the Officer in Charge of JRCC Victory.

[139] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 31-31, 38, 181.

[140] "Dead Labrador boy's family slams DND search 'failure:' Family dismisses military's explanation for delay, citing private chopper," *CBC*, last modified 04 February 2012, http://www.cbc.ca/news/canada/newfoundland-labrador/dead-labrador-boy-s-family-slams-dnd-search-failure-1.1186502. Note: air searches require trained air spotters and specific patterns based upon the size of the search object in combination with the terrain. See Chapters 4 and 5 of the *Canadian Aeronautical and Maritime Search and Rescue Manual*.

The deliberate effort to achieve a synergistic approach to SAR delivery is summed up in the forward of the National SAR Manual by John Young, the Chairman of the SAR Council. Australian SAR arrangements are designed to "complement other emergency services (police, fire, ambulance) in circumstances where those services are unable to operate effectively."[141] In essence, they are assisting with situations that exceed the resources and capabilities of the original responding authority. Of course with such a span of agencies involved in the SAR effort, reporting and common measures of performance are necessary to ensure actions remain aligned and responsible authorities remain informed on both past activities and future objectives.

Statistics, Performance Measures, and Risk Management

Although the SAR Council recognized the need for a performance report, as reflected in the 2014 Council Papers, one has not yet been posted.[142] However, the absence of the report does not hinder discussion of its vision and the challenges associated with the statistical effort thus far.

A review of past SAR Council reports indicates that the initial assignment of metrics for a SAR service can be difficult to define and quantify. For example the 2013 Council Report discussed capturing "persons assisted" as well as "persons saved" for statistical purposes. This raised the necessity of interagency agreement and the creation of new definitions as well as amendment to SAR case data management systems to capture the additional statistics.[143] However, the benefits of collecting statistical data in order to quantify emerging trends outweighed the barriers as the data could focus prevention efforts. At the same time, the

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[141] Australian Maritime Safety Authority, *National Search and Rescue Manual …*, 1.

[142] Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 9; Australian Maritime Safety Authority, National Search and Rescue Council, "Council Reports," last accessed 13 February 2016 https://natsar.amsa.gov.au/council-reports.asp.

[143] Australian Maritime Safety Authority, National Search and Rescue Council, *37th National Search and Rescue Council* (6-8 November 2013), 11.

difficulty of assigning a dollar value to volunteers was also recognized, along with fact that advertising financial statistics should not detract from SAR's purpose of saving lives.[144] Mindful of the considerations, the latest (2015) report indicates that this statistical initiative is moving forward. Despite database modification challenges, it was acknowledged that establishment of common criteria will allow national statistics representative of the entire Australian SAR system.[145]

The 2014 Council Papers statistically captured the categories of case load, notable incidents, causative factors, training undertaken, and future developments.[146] There were also some unique metrics produced, aside from these standardized categories. The State of Queensland reported 368 land cases and 931 marine cases. They further broke down this effort into 8,228.5 police man hours and 29,665 volunteer man hours, with an interesting "Savings to Community: $8,350,680,000.00 in returned lives."[147] This is an interesting metric applied to SAR, and quite possibly due to the close association of police, SAR, and health services. Nonetheless, using an applied economics approach, a quantifiable value for the provision of SAR services can actuarially be determined.[148] Jim Whitehead, a Senior Sergeant with Queensland State Search and Rescue assessed that in 2012, using an average of 2000 people rescued per year, SAR services saved the Australian economy about $10 billion.[149]

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[144] Australian Maritime Safety Authority, National Search and Rescue Council, *37th National Search and Rescue Council* (6-8 November 2013), 12.

[145] Australian Maritime Safety Authority, National Search and Rescue Council, *Thirty-ninth meeting of the Australian National Search and Rescue Council* (14-16 October 2105), 14.

[146] Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers* (1-3 October 2014), 9-109.

[147] *Ibid.,* 9-10.

[148] Peter Abelson, "The Value of Life and Health for Public Policy," *Applied Economics*, last accessed 13 February 2016, http://www.appliedeconomics.com.au/pubs/papers/pa03_health.htm.

[149] Jim Whitehead, "Search and rescue in Australia," …, 43.

Statistics aside, AMSA also posts performance levels and then measures achievements against those benchmarks. These SAR performance levels are listed, along with performance levels of other AMSA areas of responsibility, in the overarching AMSA Corporate Plan. The performance levels are intended to measure alignment of activities with future and current strategic challenges and objectives both within the short horizon Corporate Plan as well as the longer horizon AMSA Strategic Vision 2013-2033.[150] The Corporate Plan includes performance measures for the following: 100 percent lives saved to those at risk; 100 percent serviceability of SAR-related communication services; ability for the system to undertake 8500 SAR cases and 740 searches; 30 minute median for the JRCC to task SAR resources following receipt of a distress call; and an average resource-on-scene arrival time of 150 minutes (180 night) for cases under JRCC SAR authority. Every AMSA Annual Report then grades the SAR performance as a percentage to which the measure was achieved, along with reasons the targets were not met. For example, communication services and lives saved were less than 100 percent – this was due to hardware malfunctions and the nature of injuries, respectively.[151]

Notwithstanding the above, AMSA is not just about SAR; the AMSA Annual Report aligns all activities with identified objectives, demonstrating the value in a collocated role of marine regulator and SAR responder. For example, AMSA personnel conducted ship inspections to confirm that commercial vessel equipment and manning levels met international regulations. Vessels that repeatedly failed to comply were detained or banned under Australia's new *Navigation Act 2012*. The consequence of a regulatory, compliance, and enforcement approach protects both seafarers and the waters. Although Australia has a nationwide Emergency Towage

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[150] Australian Maritime Safety Authority, *AMSA's Vision 2013–33* (Canberra: Australian Maritime Safety Authority, 2013), 8-9, https://www.amsa.gov.au/forms-and-publications/Publications/AMSA_ Vision_2013-33.pdf; Australian Maritime Safety Authority, *Corporate Plan 2015-2019 …*, 5-6.
[151] Australian Maritime Safety Authority, *Corporate Plan 2015-2019 …*, 15, 135.

Capability program, prevention is always cheaper.[152] The scenario Australia is trying to prevent

unfolded in Canada as illustrated by a SAR incident that occurred in October 2014 when a

broken down deep sea cargo vessel, the *Simushir*, nearly drifted aground off Haida Gwaii and in

March 2014 when the cargo vessel *John 1* ran aground off Newfoundland.[153]

The benefit of the SAR authority as regulator synergy extends to pleasure craft, which are

a state or territorial responsibility. The state places requirements dependent upon SAR asset

availability and the water conditions. As a result, each region has slightly different requirements

but, unless otherwise exempted, pleasure craft require a registered 406 MHz emergency locator

beacon if operating beyond three nautical miles from shore and a marine radio if operating more

than two nautical miles offshore.[154] The beacons and radios allow quick notification of a distress

situation while the radios additionally permit SAR provision by means of mutual assistance.

Shaping the on-water situation in this fashion both lessens the burden on the SAR response

system by narrowing the potential search area and minimizes potential loss of life by improving

the potential response time.

The regulator and SAR authority synergy does not extend to the aviation milieu;

however, AMSA and Australia's regulator, the Civil Aviation Safety Authority (CASA), do

consult regarding the effect of regulatory changes on SAR operations.[155] The federal

organizational structure assists in this consultation as both the AMSA and the CASA report to

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[152] Australian Maritime Safety Authority, *Annual Report 2014-15 …*, 3, 37, 56, 58, 136.

[153] Fisheries and Oceans, "Foreign Vessel M/V Simushir Adrift Off the Coast of British Columbia," last modified 17 October 2014, http://news.gc.ca/web/article-en.do?nid=894979; *CBC*, "Grounded cargo vessel John 1 lost power, drifted to shore," last modified 16 Mar 2014, http://www.cbc.ca/news/ canada/newfoundland-labrador/grounded-cargo-vessel-john-1-lost-power-drifted-to-shore-1.2574785.

[154] Dave Bacchus, "Australian SAR System," e-mail to author, 24 December 2015.

[155] Scott Constable, "Updated Questions," e-mail to author, 03 February 2016.

the Minister for Infrastructure and the Environment.[156] Nonetheless, some differences arose

regarding the mandatory carriage of 406 MHz Emergency Locator Transmitters (ELTs), as

CASA allowed for some aircraft exemptions as well as carriage of a personal locator beacon

(PLB) in lieu of the fixed and registered 406 MHz ELT for certain categories.[157] The lack of

mandatory 406 MHz ELTs regulations was also a concern for the RCAF, so Canada's challenge

was not unique.[158] Australia's challenge however, is advertised in published statistics; in 2014

there were 435 alert activations on 121.5 MHz and only five were a real distress.[159] Though

helpful, mandatory regulations are but one weapon that can be used to mitigate risk.

Identified in their Strategic Outlook 2012-2015, the SAR Council's intent is to adopt a

risk-based response, an approach already used by AMSA. This organization documents its

strategic risk profile showing inherent risk, control measures, and residual risk. With regards to

SAR, the inherent risk of "a major incident with loss of life and/or significant environmental

harm" is assessed as extreme. Using international standard risk management methodologies,

regulation was only one of 21 mitigating weapons listed as a defence to combat this concern and

bring the residual risk down to an assessed level of moderate.[160] A risk-based approach is not

only a way to formally document actions taken to mitigate risk, but when done correctly is a

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[156] Department of Infrastructure and Transport, *Australia State Aviation Safety Program* (Canberra: Department of Infrastructure and Transport, 2012), 13, https://infrastructure.gov.au/aviation/safety/ssp/ files/Australias_State_ Safety%20Program_2012_FA7.pdf.

[157] Civil Aviation Authority, ""Notice of Final Rule Making. 406 MHz Emergency Locator Transmitters (ELTs)," *CASA Regulatory Development Management Branch Document NFRM 406 ELT – January 2009,* 7-8, https://www.casa.gov.au/sites/g/files/net351/f/_assets/main/newrules/special/ nfrm_406elt_ preamble.pdf; Scott Constable, "Updated Questions," e-mail to author, 03 February 2016.

[158] Transport Canada, Canadian Aviation Regulation Advisory Council, *CARAC Activity Reporting Notice # 2015-013 – Emergency Locator Transmitters* (June 2015), http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/npa-apm/doc.aspx?id=10404; David McKie, "Search and rescue for false alarms costs millions," *CBC,* last modified 01 April 2014, http://www.cbc.ca/news/politics/search-and-rescue-for-false-alarms-costs-millions-1.2594306.

[159] Australian Maritime Safety Authority, National Search and Rescue Council, *38th National Search & Rescue Council 2014 Contents and Meeting Papers,* (1-3 October 2014), 117.

[160] Australian Maritime Safety Authority, *Annual Report 2014-15 …,* 21, 151.

systematic and inclusive process that involves necessary stakeholders and also assigns risk

owners that are accountable for correctly managing the risk.[161]

Antarctic

Noted at the beginning of this chapter, another challenge shared by both Canada and

Australia is the responsibility for SAR in a portion of their respective polar regions. The

Antarctic is not listed as a specific challenge in the Strategic Vision 2013-33, but its essence is

captured through the broad objectives of "influencing international arrangements" and

"addressing growth and complexity in [the] operating environment."[162] The 2014 Annual Report

notes that AMSA executives provided a submission to a Defence and Trade Committee inquiry

concerning Australia's responsibilities in the Southern Ocean and Antarctic waters, outlining the

particular challenges for SAR in the region. The report also notes AMSA engagement with the

various Antarctic Programs, Treaty Councils and the IMO regarding SAR provisions in the Polar

Code and SOLAS.[163] Through a Memorandum of Understanding, AMSA's SAR partner is the

Australian Antarctic Division (AAD). The AAD seasonally operates an Airbus A319-115LR, a

ski equipped BT-67 Basler, a DHC-6 Twin Otter, four AS 350 B3 helicopters, a 90 metre supply

ship with a helideck as well as multiple tugs and smaller watercraft.[164] Finally, to pool scant

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[161] ISO 31000:2009, "Translated Into Plain English," last accessed 14 February 2016, http://www.praxiom.com/iso-31000.htm.

[162] Australian Maritime Safety Authority, *AMSA's Vision 2013–33 …*, 10-11.

[163] Australian Maritime Safety Authority, *Annual Report 2014-15 …*, 20, 51, 74,75.

[164] Australian Maritime Safety Authority, *Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters submission 9 …*, 6; Department of the Environment Australian Antarctic Division, "Australian Antarctic Division: Leading Australia's Antarctic Program, Australia's Antarctic aviation," http://www.antarctica.gov.au/ living-and-working/travel-and-logistics/aviation; Department of the Environment Australian Antarctic Division, "Australian Antarctic Division: Leading Australia's Antarctic Program, Ships," http://www.antarctica.gov.au/living-and-working/travel-and-logistics/ships.

regional resources, AMSA maintains SAR agreements with neighbouring SRRs and actively works with these partners to establish a shared near-time resource picture for SAR.[165]

Therefore, although there are differences between the Antarctic and the Arctic's accessibility – the Antarctic is surrounded by uninterrupted ocean and activities revolve around various countries' National Antarctic Programs – they are both demanding environments with few resources.[166] Like Australia, Canada supports the respective IMO Polar Code and is party to international agreements; namely the Arctic SAR Agreement.[167] What Canada does not yet have is a near-time picture of commercial and government resources, or designated domestic partner resources in the Arctic.

Conclusion

Using the ICMSAR construct of multipurpose resources, the Australian SAR Authority provides SAR services that meet its international obligations and national objectives. Australia's SAR system can be described as multilayered, with a defined structure across federal government departments as well as down state lines where public federal, public state, private, commercial, volunteer and community funded models collectively achieve their SAR objectives. Such a structure requires a plan and policy framework. AMSA's describes this in their Strategic Vision 2013-33: all activities align with strategic goals; resources match capacity and capability; performance is monitored; and, decisions are based on evidence.[168] Challenges were experienced in standardization and information capturing in separate databases, but the long-term importance for accountability, decision making, gap analysis, and risk management was recognized.

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[165] Australian Maritime Safety Authority, *Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters submission 9 …*, 6.
[166] *Ibid.,* 6-7.
[167] Arctic Council, *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic,* (Arctic Council Secretariat, 2011), 2, https://oaarchive.arctic-council.org/handle/ 11374/531.
[168] Australian Maritime Safety Authority, *Annual Report 2014-15 …*, 21.

Aiding this framework, AMSA is in large part, the regulator, provider and coordinator of SAR. Though not the aviation regulator or the authority for all SAR activity, AMSA stands by to advise, assist, and coordinate. Holding the position of Chair and Secretariat for the SAR Council, AMSA plays a lead role while recognizing the importance of the complementary partnerships that are underpinned by Memorandums of Understanding and intergovernmental agreements with police, AAD, and the ADF. Arguably, the federal reporting structure which has both AMSA and CASA report to the same parliamentary department, the Minister for Infrastructure and Transport, supports alignment.

In Canada, there is not yet the culture of a collective risk-managed approach, nor are the responders for air and marine SAR the regulators. Though this could be addressed through other means, there is an arguable value in having one responsible agency fund regulation, inspection, prevention and response activities because these activities are interdependent. The actions, or inactions, of one aspect may have a profound effect on SAR response efficiency and effectiveness. As will be shown in the next chapter, Canada's SAR program has older roots but many of the same elements as Australia's SAR system.

Chapter 3 – ORGANIZATIONAL EVOLUTION OF CANADA'S SAR SYSTEM

Introduction

Examining international conventions as well as the SAR system of a comparable country

demonstrates that there are alternate ways to fulfill a national SAR program. As the conventions

note, an effective system can be achieved using multipurpose resources – an approach that

Australia employs. This chapter will consider the evolution of Canada's national SAR system to

determine the historical basis behind the current structure.[169] In doing so, it will uncover ideas

and considerations that can be used to set the foundation for a framework to achieve an effective

and efficient SAR program that meets contemporary demands.

Inception to the 1960s

Canada's formal SAR system dates back to a cabinet decision on 18 June 1947. This

cabinet meeting approved SAR funding and noted that "[t]he Air Force would continue to

discharge primary responsibility for coordination of the overall system."[170] The meeting

solidified a previous cabinet decision from 16 January 1946 that rejected the establishment of an

RCMP SAR service because "an adequate rescue organization for aircraft in distress could be

provided by existing services in cooperation, and that the Department of National Defence for

Air should undertake responsibility for necessary cooperation."[171] The date 16 January 1946 was

also the day ICSAR was established, originally comprised of the "Departments of Justice

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[169] Note this is not a detailed history of RCAF SAR, but intended to look at the organizational development of the current National SAR Program.

[170] Privy Council Office, Cabinet Conclusions 18 June 1947, 4,-5. Available: http://central.bac-lac.gc.ca/.item?op=img&app=cabinetconclusions&id=e000823823 and 824; Department of National Defence, Canada Command, "EXHIBIT/P-00051 Canada Command SAR CONOPs," last accessed 09 April 2016, http://www.oshsi.nl.ca/userfiles/files/P00051.pdf.

[171] Privy Council Office, Cabinet Conclusion 16 January 1946, 8. Available: http://central.bac-lac.gc.ca/.item?op=img&app=cabinetconclusions&id=e000822125 and 126.

(R.C.M.Police), Transport, Fisheries and National Defence."[172] Significantly, since its inception, the SAR system was intended to have a co-operative, cross-jurisdictional response using existing services.

Prior to 1947, SAR was provided on an ad hoc basis, but demand had grown steadily following the First World War. [173] Airplanes were inexpensive and private flying had few restrictions; given Canada's geography, explorers utilized air travel extensively.[174] The newly created RCAF, with its relatively high flying experience, was even assigned jurisdiction over the domestic civil aviation industry in 1924.[175] Concurrently, an international civil aviation industry was emerging. Geographical location drove Canada's early engagement due to the mutual British and American push for a transatlantic air service.[176] This phenomenon saw the establishment of aviation standards and the eventual provision of air SAR services through membership obligations of the ICAO after its establishment in 1944.

At the inaugural 52-nation aviation conference in Chicago, Canada's delegation was outnumbered only by those of the United States and Britain, and its influential role is described by Canadian historian David MacKenzie. This conference culminated in the signing of the Convention on International Civil Aviation and the eventual establishment of the newly formed organization's headquarters located in Montreal. Though the SAR annex was not adopted until

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[172] Privy Council Office, Cabinet Conclusion 14 October 1953, 15. Available: http://central.bac-lac.gc.ca/.item?op=img&app=cabinetconclusions&id=e000831265. Note this document refers back to the 1946 cabinet meeting noting that ICSAR was established on 16 Jan 1946.

[173] Larry Milberry, *Sixty Years: the RCAF and CF Air Command 1924-1984,* gen. ed. Larry Milberry (Toronto: CANAV Books, 1984), 209.

[174] Statistics Canada, Transportation Division Aviation Statistics Centre, *Aviation in Canada: Historical and Statistical Perspectives on Civil Aviation* (Ottawa: Supply and Services Canada, 1986), 14-15.

[175] Frank H. Ellis, *Canada's flying heritage* (Toronto: University of Toronto Press, 1954), 60.

[176] David MacKenzie, *Canada and International Civil Aviation 1932-1948* (Toronto: University of Toronto Press, 1989), 9, 17, 55.

25 May 1950, the earlier establishment date of this international lifesaving service in Canada is a testament to the level of aviation interest and leading engagement in ICAO's intentions.[177]

The RCAF did not represent Canadian civil aviation at the 1944 conference. On November 2, 1936, with a war looming, jurisdiction over civil aviation was transferred to a newly formed Department of Transport (DoT) and all civilian transportation modes were centralized under one authority.[178] This fusion is significant; not only were regulatory and safety aspects of transportation now under a single department, but the DoT became an ICSAR member in 1946, and on 26 January 1962 the DoT's marine fleet became the Canadian Coast Guard.[179]

While aviation burgeoned following the First World War, the need for maritime SAR existed well before, and had been undertaken mainly by volunteers. The first government involvement occurred when Nova Scotia set up a full relief establishment for shipwrecks on Sable Island in 1809.[180] It was not until 1871 that the Department of Marine and Fisheries started to establish dedicated oar powered lifeboat stations on the Great Lakes, the Gulf of St Lawrence, in Nova Scotia and at the entrance to the Strait of Juan de Fuca in British Columbia. By 1914 there were 40 stations: four in New Brunswick, sixteen in Nova Scotia, five in Prince Edward Island, eleven on the Great Lakes and four in British Columbia. By 1946, the DoT had a mixed fleet of vessels comprised of lighthouse supply ships, hydrographic survey ships, icebreakers,

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[177] David MacKenzie, *ICAO: A History of the International Civil Aviation Organization* (Toronto: University of Toronto Press, 2010), 26-51, 78, 104, 172

[178] Thomas E. Appleton, *Usque ad Mare: A History of the Canadian Coast Guard and Marine Services* (Ottawa: Queen's Printer, 1969), 95.

[179] Canadian Coast Guard, "History of the Canadian Coast Guard," last modified 22 July 2014, http://www.ccg-gcc.gc.ca/eng/CCG/History.

[180] Appleton, *Usque ad Mare …*, 133, 140.

buoy tenders, and weather ships as well as a Marine Regulations Branch contributing to SAR through the ICSAR.[181]

Implementation of this new SAR system had challenges. Arguably, this could have been expected; firstly it was new and secondly the RCAF, while responsible for cooperation, had no authority over other departments.[182] An example is inferred from a 10 July 1951 cabinet meeting whereby the RCAF was to make "full reports to appropriate authorities within three days" whenever "a government-owned ship was unwilling or unable to comply with a request of an R.C.A.F. Rescue Coordination Centre to assist a vessel in distress." It was also discovered at this meeting that some federal ships were unaware of the requirement to provide assistance. This point was raised by the Minster of Fisheries who suggested that "adequate steps be taken to inform Canadian vessels of the procedures for reporting to R.C.A.F. Rescue Coordination Centres."[183] Cabinet Directive number 22 dated 12 July 1951 clarified the situation, stating that the RCAF was to coordinate all marine SAR through RCCs Halifax, Trenton and Vancouver and that all government ships were to take part in marine SAR.[184]

These were early days – RCAF officers had minimal understanding of marine vessel operations – yet it appears to have taken about nine years for the DoT to attach an experienced

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[181] Appleton, *Usque ad Mare …*, 141-145, 275-300, 309-311. Chapter IX in *Usque ad Mare* provides a detailed history on the evolution of early marine regulations.

[182] Richard Evan Goette, "Canada, the United States and the Command and Control of Air Forces for Continental Air Defence from Ogdensburg to NORAD, 1940-1957" (PhD Dissertation, History, Queen's University, 2009), 59-62. Co-operation was the typical command and control arrangement between Canada's military services because it limited authority each had over the other for joint endeavours. It is therefore not surprising that the RCAF took a similar approach with other government departments in SAR.

[183] Privy Council Office, Cabinet Conclusion 10 July 1951, 3-4. Available: http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/item.aspx?IdNumber=11139.

[184] Graham Newbold, "List of Cabinet Documents related to SAR," e-mail to author 24 November 2015. Note: this e-mail listed Cabinet Documents by date in the period from 1947 to 1960, including the date of Cabinet Directive #22. Graham Newbold is a senior analyst at the NSS.

Marine Officer to JRCCs in order to provide advice to RCAF officers conducting SAR

coordination with both federal and private vessels.[185]

Though this pace might seem slow, it is important to consider that there were other, more

pressing high level government and departmental concerns than oversight of a young SAR

system. The 1950s saw commitments to NATO, the Korean War, and the establishment of

NORAD.[186] The building of NORAD's early warning systems did have a secondary benefit for

SAR – one of the steps to this day for air searches involves confirming whether NORAD has

flight track information that might be correlated to the missing search object. The 1960s,

however, saw only minimal cabinet-level SAR activity according to the NSS's "History of SAR

Cabinet Documents" and the cabinet archives website.[187]

1960 – 1980: A New ICSAR and Lead Minister

At the tactical level there was great enthusiasm and interagency cooperation for SAR. A

1951 article in the RCAF's service publication, *The Roundel*, serves as proof: "it is in searches

for missing aircraft that the whole vast organization of the search and rescue service is brought

into operation … R.C.M.P., provincial or local police forces, Navy, Army, Department of

Transport."[188] This tradition of enthusiasm continued through the upheaval of unification in the

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[185] Department of Transport. Marine Operations Branch. *Marine Search and Rescue in Atlantic Area* (Ottawa: Queen's Printer and Controller of Stationery, 1961), 4; Graham Newbold, "List of Cabinet Documents related to SAR," e-mail to author 24 November 2015. Note: the list of SAR Cabinet Documents showes date the Minister of Transport appointed Recue Coordinators – reference Canada Shipping Act and Cabinet Decision 276, (1960) and CAS memorandum acknowledging RCAF responsibility for marine SAR with the establishment of marine advisers to aid, November 1961. These dates are cross referenced to the Marine Operations Branch booklet.

[186] Desmond Morton, *A Short History of Canada* (Toronto: McClelland & Stewart, 2006), 267, 274-275, 277.

[187] Graham Newbold, "List of Cabinet Documents related to SAR," e-mail to author, 24 November 2015. Note: this e-mail listed a history of SAR Cabinet documents last updated March-April 2001; Library and Archives Canada, http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/list.aspx?k=search+and+ rescue&.

[188] S.R. Miller, "Search and Rescue in the R.C.A.F.," *The Roundel* 3, no.2 (January 1951), 19.

1960s that merged the three separate services into the Canadian Forces.[189] That the *1964 White Paper on Defence* combined SAR with aid to the civil power as an additional task of "quasi-military nature for which the Department of National Defence has some responsibility," arguably shows that the strategic and political levels either were unaware or did not care that the RCAF was assigned overall responsibility for air and marine SAR. [190] That said, the historical international context was thermonuclear war and expansionist aims of Communist bloc countries while domestically provinces challenged federal authority and Quebec pushed for independence.[191]

Perhaps in preparation for the pending unification, the RCAF commissioned a Defence Research and Development Canada (DRDC) study to provide options for the RCAF to discharge its SAR obligations. It noted that the RCCs were the core of search and rescue in Canada, but that the DoT's air traffic control centres were also a logical choice to conduct SAR coordination. Nonetheless, the study concluded that the RCC construct was "direct, efficient and economical."[192] The existence of the current SAR system is a testament to the fact that the RCAF, ultimately, retained the SAR responsibility.

The study also noted that civilian, state and non-SAR military aircraft were underutilized in SAR and that better SAR response could be delivered by using resources close to the scene rather than primary SAR resources. Further, the study identified that the need for specialized training arose from the rescue part of SAR operations, not search. Additionally, the low tasking

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[189] Note: Squadron history books (103, 442, 413, 424 listed in bibliography) and Mowbray, "Lessons Forgotten …," provide further details on distribution of aircraft and the new base locations.

[190] Department of National Defence, *1964 White Paper on Defence* (Ottawa: Queen's Printers, 1964), 10-11, 13.

[191] Desmond Morton, *A Short History of Canada …*, 282-283, 285, 293-294.

[192] Defence Research and Development Canada/Chief of Operational Requirements, *DRDC/CORA: An Evaluation of the Future RCAF Search and Rescue Requirement.* (RCAF File 5983-102(DSE)) (Ottawa: DRDC/CORA, 1964), 1-3.

rates for helicopters indicated that, even the rescue function might be undertaken as a secondary role by other RCAF units.[193] Although on the surface this study supports the argument that an encompassing and integrated SAR system is effective and efficient, it is important to consider that the study may have been tainted by the government climate of the period and that the findings are now out of date. However, data from a contemporary report by the Chief of Review Services indicates that many parts of the 1964 study remain relevant. This recent report noted the need to re-emphasize civilian resource use for searches, as their use declined with increased availability of primary SAR aircraft, and the need to better track and utilize commercial assets. Finally, the report acknowledged the efficiency of multirole taskings, noting the training value derived concurrent with employment on other military tasks.[194] Likewise, there is similar training value when conducting other non-SAR tasks, such as provincial medevacs.

The noted enthusiasm and interagency cooperation at the tactical level, whether by squadrons or the RCCs, was crucial during the period of unification until the formation of Air Command in 1975. Although squadron history books note the effect of unification on the squadrons as they were closed and moved, there is not one source that describes the impact solely on the SAR structure. It was simply, as described by G.Y. Smith, a former Commanding Officer of 103 Rescue Unit, "the Era of Survival."[195] Military historian Allan English notes that the air element was disadvantaged when it became a "loose amalgam" of dispersed resources that lacked a command structure and became subordinated to the land and sea elements.[196] Air

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[193] Defence Research and Development Canada/Chief of Operational Requirements, *DRDC/CORA: An Evaluation of the Future RCAF Search and Rescue Requirement* …, 5, 8-11.

[194] Department of National Defence, Chief of Review Services, *Evaluation of the DND/CAF Contribution to the National Search and Rescue Program* (1258-216 (CRS) January 2015), 16-18, 20, 29-33, A3/4-4/4.

[195] G.Y. Smith, *Seek and Save: the History of 103 Rescue Unit* (Erin, Ontario: Boston Mills Press, 1990), 101, 105.

[196] Allan English, *Command & Control of Canadian Aerospace Forces: Conceptual Foundations* (Trenton: Canadian Forces Aerospace Warfare Centre, 2008), 60, 61.

Command's organization breathed life into Canada's professional air personnel, just as SAR again became the topic of cabinet meetings over the need to improve marine SAR. [197] Though Cabinet discussion and an interdepartmental study were already underway in the summer of 1976, it was spurred by an autumn that had an "unusually high number of marine incidents off the east coast of Canada [that] resulted in loss of life."[198]

The cabinet meeting in the summer of 1976 revolved around coordination, resource sharing and the subtle admonishment to appreciate governmental priorities versus narrower departmental priorities. The cabinet was critical of the DoT's "unsubstantiated" equipment acquisition proposals as there had been: no interdepartmental consultation on multi-use of existing capabilities resident within the other departments; no consultation with stakeholders (fishermen) on the effectiveness of the proposed equipment; and, no attempt to consider other sources (such as private vessels or volunteers).[199] Essentially, the meeting transcript reads like a request for some form of encompassing gap analysis.

Unfortunately, time was not on the cabinet's side. Though the role that a strong SAR framework could have played in identifying and championing areas at high risk for loss of life cannot be proven after the fact, the result of its absence is written in blood. After RCAF rescue units were closed in the mid-60s, Newfoundland had no primary SAR capability. There had been US naval aircraft stationed in Newfoundland, but by the mid-70s they were also closed. Though there were statistics pointing to narrowly averted maritime disasters, finally a Dutch freighter

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[197] Privy Council Office, Cabinet Conclusion 08 July 1976, 12-13. Available: http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/item.aspx?IdNumber=42294.
[198] Smith, *Seek and Save: the History of 103 Rescue Unit …*, 105.
[199] Privy Council Office, Cabinet Conclusion 08 July 1976, 13. Available: http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/item.aspx?IdNumber=42294.

sank during a North Atlantic storm and all but 2 of the 15 men perished.[200] This provided the incentive needed to re-visit SAR.

The cabinet meeting following the tragedy resulted in a number of changes to the SAR system and resources. The most organizationally significant changes included agreement that ICSAR, though it had previously existed, be re-established with assigned responsibilities that included the establishment of a comprehensive SAR plan.[201] This is the ICSAR formation date and membership referred to in SAR manuals today.[202] Further, DoT and DND were to ensure uniform application of SAR policies, improve the RCC organizational structure and capture SAR statistics. Finally, "as previous attempts at coordination had been disorganized" this meeting identified the need for a single minister responsible for SAR.[203]

This governmental activity was also captured by a January 1977 article in the RCAF Association's flagship publication, *Airforce* magazine. The article notes that "Transport Canada, the Department of National Defence, and the Department of Fisheries and the Environment had been established to coordinate … resources, as well as to integrate new equipment and procedures." By 1977 the Minister of National Defence had been named as the Lead Minister for "all aspects of SAR … over both land and sea." The article reflects the expectation that SAR capability "should be much improved by the integration" of all federal resources – which at the

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[200] Smith, *Seek and Save: the History of 103 Rescue Unit …*, 105.

[201] Privy Council Office, Cabinet Conclusion 04 November 1976, 14. Available: http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/item.aspx?IdNumber=42667.

[202] DND / CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual …*, 1.05, 1 of 2.

[203] Privy Council Office, Cabinet Conclusion 04 November 1976, 12-17. Available: http://www.bac-lac.gc.ca/eng/discover/politics-government/cabinet-conclusions/Pages/item.aspx?IdNumber=42667.

time numbered "about 700 fixed and rotary wing aircraft and over 1,000 vessels of various types and sizes."[204]

1980 – 1990: NSS Born Out of Tragedy

Whether as a follow up to the 1976 alignment or in response to the adoption of the ICMSAR in 1979, cabinet directed an encompassing "assessment of the effectiveness of Search and Rescue in the form of a program evaluation."[205] It is certainly plausible that it was related to the ICMSAR adoption as it required "[p]arties to the Convention … to ensure … provision of adequate SAR services in their coastal waters."[206] Arguably, it was not a coincidence that this was also the time period during which Australia began a unified approach to SAR delivery.

This 412 page tome, titled *Report on an Evaluation of Search and Rescue (ROESAR),* was published in 1982. The evaluation examined organization and management, achievement of program delivery objectives, types of incidents, services that could prevent SAR incidents and operational performance of the SAR system.[207] This evaluation was not just along departmental lines: it concerned the entire system.

The report does not simply follow an observation and recommendation format – solutions are offered. A perfect example of this approach is shown in the derivation of a level of service policy. The report reasons that a deliberate SAR structure tying rescue to the timespan of survival along with a defined level of service, would allow resources to be appropriately positioned. Without this structure "vessels and aircraft may be acquired and positioned that

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[204] "SAR Strengthened." *Airforce* 1, no.1 (January 1977): 28-29.

[205] Cabinet. Committee on Foreign and Defence Policy, *Report on an Evaluation of Search and Rescue* (Ottawa: Canadian Government Publishing Centre, Supply and Services Canada, 1982), 1.

[206] IMO, "International Convention on Maritime Search and Rescue (SAR) Adoption: 27 April 1979," last accessed 12 December 2015, http://www.imo.org/en/About/Conventions/ListOfConventions/ Pages/International-Convention-on-Maritime-Search-and-Rescue-(SAR).aspx.

[207] Cabinet. Committee on Foreign and Defence Policy, *Report on an Evaluation of Search and Rescue ...,* 1-4.

provide too much or too little service for either policy or need."[208] The report's proposed SAR

system operation is based upon a combination of: appropriate regulations to extend survival

time; rapid distress notification to speed response; and, multiple response options consisting of

either federal, volunteer, or opportunity resources.[209] This methodology recognizes the "trade-

offs in making decisions [and] the mix of prevention and safety programs impinging on SAR."[210]

This approach also captures contemporary ideas of mandated 406 MHz emergency beacon

carriage on aircraft as well as possible future requirements for all vessels to carry VHF radios for

distress notification.

An example of the benefits of rapid alerting to speed response occurred during the night

of 29 September 2014. A family was transiting the waters near Nanaimo, British Columbia, in

their fishing vessel when it rapidly took on water. In darkness, the family struggled to abandon

their vessel. The father had the awareness and the radio to transmit a short mayday call. Had he

not transmitted the short distress broadcast, given how quickly the vessel sank and the fact that

they did not all have lifejackets, it was dark, the waters were frigid, and the hull was sinking

below the water line when rescuers arrived, some of the family members would likely have

perished.[211]

The *ROESAR* approach prevents predictable but narrow departmental responses such as

those tabled by the CCG and DND to the 2013 Auditor General's recommendation that provision

of service level updates were required to ensure relevance with current SAR needs. The

responses stated that examination of individual departmental posture would occur, but said

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[208] *Ibid.,* 154.
[209] *Ibid.,* 156-157.
[210] *Ibid.,* 93.
[211] *CBC*, "Updated Galiano Island rescue: Coast guard saves 7 from sinking fishing boat 'Great end to what could have been a tragic story,' says rescue official," last modified 29 September 2014, http://www.cbc.ca/news/ canada/british-columbia/galiano-island-rescue-coast-guard-saves-7-from-sinking-fishing-boat-1.2782122.

nothing of a more encompassing examination of the availability of all system resources in order to derive a level of service for the SAR posture writ large.[212] This underscores the need for both audits and responses to consider the bigger SAR picture in order to preserve the effective and efficient system as intended.

While it is beyond this paper's scope to highlight the many astute findings in the *ROESAR*, the depth and scope of examination is what provided such a clear report of the SAR system. Some other organizational aspects included the observation that ICSAR was too departmentalized and did not address overall SAR program needs such as alternative postures and provincial, volunteer and private resources.[213] Management-related recommendations included that a minister, other than the MND, be responsible for all aspects of the SAR program, advised by one official with support staff at arm's length from departments with SAR responsibilities; there be an ICSAR Secretariat established; and ICSAR representatives have authority to speak for respective departments so that responsibility and accountability rests below the cabinet level.[214] An encompassing report, such as this, will be an indispensable point of reference for any formal SAR framework.

The recommendations in the *ROESAR* foreshadowed and planted the concept for many recommendations that flowed from the *Royal Commission on the Ocean Ranger Marine Disaster* report. The Ocean Ranger was a drilling rig with 84 crew members on board that sank on 15 February, 1982, 170 nautical miles east of Newfoundland – there were no survivors.[215] The

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[212] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 8-9.

[213] Cabinet. Committee on Foreign and Defence Policy, *Report on an Evaluation of Search and Rescue ...,* 93, 338-339, 329-330.

[214] Cabinet. Committee on Foreign and Defence Policy, *Report on an Evaluation of Search and Rescue ...,* 342, 402-403.

[215] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster. Report one: the loss of the ...,* iii.

Royal Commission made a multitude of recommendations, many of which were directed at the

missing SAR structure.

Arguably most poignant was reiteration of the findings that no single agency had the

mandate to bring together disparate components "into a comprehensive national SAR program,"

that the lead minister should come from a department without a SAR delivery role, and that

DND and CCG SAR activities were discrete rather than integrated to provide more timely

response.[216] Further, the need was identified for statistical analysis of SAR incidents as a means

to drive policy, planning and selection of operational resources as well as deployment of

resources. However, this analysis had to be done with consideration of the type of incident

(possibly a weighting system) to avoid invalid statistical conclusions.[217] This very error occurred

in the DND response to the 2013 Auditor General's report on levels of SAR readiness.[218] DRDC

statistical analysis was undertaken of all distress and potential distress incidents without

consideration of whether an aircraft would even have been logically tasked on the event.[219] As a

means of comparison, SRR Victoria undertook a local study by DRDC that discounted cases that

were in relatively close proximity to existing CCG stations. As expected, the Victoria study

determined different times for optimized response than the first study.[220] A difference is

attributable to the high volume of pleasure craft incidents near large population centres where

there are multiple CCG, SAR volunteer, and other vessels of opportunity in close proximity to

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[216] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore eastern Canada: summary of studies & seminars* (St. John's, Nfld.: The Commission, 1985), 121-122, 161.

[217] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore ...,* 119-120, 162.

[218] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 8-9.

[219] Defence Research and Development Canada, *DRDC-RDDC-2014-R12, Optimal Alignment of Search and Rescue Response Posture with Historical incident occurrence* (Ottawa: DRDC, 2014), 11-12, 35.

[220] Defence Research and Development Canada, *DRDC-RDDC-2015-L096, Review of 2008-2014 Joint Task Force Pacific Joint Rescue Coordination Centre Search and Rescue demand and 2014 posture change* (Victoria: DRDC, 2015), 8.

respond.[221] Obviously, further refinement is required, but this serves to underscore that statistical

analysis has to be conducted with consideration of the many inherent selection biases and pitfalls

that could lead to incorrect conclusions.

As a result of the Royal Commission's report, the National SAR Secretariat (NSS) was

created in 1986 to integrate "SAR resources within a single agency."[222] In a 1986 memorandum

to cabinet, the Minister of Energy, Mines and Resources recommended that the MND should

remain as the lead minister and, in consultation with other ICSAR departmental minsters, assume

responsibility for SAR policy. NSS would then be funded under the DND, the head of the NSS

would be the sole source of advice to the MND and the ICSAR would become an advisory

committee to the NSS.[223] In turn, the NSS would "develop a SAR policy framework … [to]

include SAR policy statements, roles and responsibilities, SAR program structure, recommended

activity and resources mixes for delivery of SAR service [and] develop SAR levels of service

standards."[224] The MND was reaffirmed as the Lead Minister in 1986 and the NSS was

created.[225]

Although not all recommendations from the Royal Commission's report were accepted,

along with the NSS, other recommendations were enacted, including the establishment of a

National Search and Rescue Program and a National SAR Objective.[226] A MND memorandum to

the Treasury Board in 1987 requesting a special allotment to support the NSS, reiterated the

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[221] Note: the author's experience as the Officer in Charge of the Victoria JRCC supported by geographical distribution of SAR incidents indicated on maps within both DRDC reports.

[222] "Agency Created to Handle Search, Rescue," *The Citizen*, Apr 15, 1986, http://search.proquest.com/docview/238927003?accountid=9867.

[223] Minister of Energy, Mines and Resources, Memorandum to Cabinet, "Response to the recommendations of the Royal Commission on the Ocean Ranger disaster," (14 February 1986), 13, 15.

[224] *Ibid.,* 15.

[225] DND/CCG, *National Search and Rescue Manual …,* Chapter 1 page 4-5. Note: although CAMSAR is the current manual, it is missing some information, such as the Lead Minster for SAR.

[226] DND/CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual …*, 1.08, 1 of 2.

same NSS responsibilities cited above, noted that ICSAR would become advisory to the new NSS, and that the NSS would negotiate and manage memoranda of understanding (MOUs) among the federal departments delineating roles and level of service standards.[227]

In contrast, Australia has all SAR aspects under a single minister; the federal and territorial components align at the National SAR Council level and then report through AMSA to that single minister. Given that Australia's system is slightly more hierarchical, versus Canada's horizontal federal construct of ICSAR, arguably this allows (and is perceived to allow) unbiased supervision of agencies' performance as well as their respect for policies and plans. Both approaches could work. Canada's MND could provide access to a broad resource base but the impartiality aspect recommended in reports might achieve other benefits such as national accord for SAR polices and plans.

1990 – Present: Upheaval and Reorganization

During this period Air Command continued to evolve. Although NDHQ did not relinquish any administrative functions to Air Command when it was formed in 1975, by the mid-80s the command and control structure of Canada's air force was organized into groups based upon operational function. SAR became a small part of Air Transport Group, a resurrection of the former Air Transport Command, given that the smaller aircraft were concurrently used for tactical transport. By the mid-90s restructuring was again underway in the form of a "streamlined CF command and control structure" as recommended by a Management Command and Control Re-engineering Team (MCCRT) in response to the *1994 Defence White Paper*. As these structural changes were "ad hoc and in reaction to various pressures," such as

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[227] Department of National Defence, "New arrangements to strengthen the central management of Search and Rescue in Canada [Department of National Defence submission to Treasury Board]," (18 June 1987), 2-7.

budget cuts, the impact on air operations as a whole was not captured, let alone SAR.[228] This is

reflected by scant records that exist for this period.[229] However, the fact that the 1994 White

Paper did not even recognize the lead role assigned to the MND and DND's responsibility for the

effective operation of the coordinated SAR system and only noted responsibility for air SAR and

provision of assistance to other authorities indicates that understanding of the oversight

responsibility was again lost upon or no longer important at the highest levels.[230] What is ironic

is that had better understanding existed and a comprehensive approach been undertaken to best

use existing resources – as recommended by studies, evaluations, and indeed overall government

intent since inception – greater cost savings quite reasonably could have been realized.

If SAR had little visibility going into the restructuring, it had less after the dust settled.

When 1 Canadian Air Division was created, it put all former operational functions, including

SAR, into one Readiness cell while leaving the Air Staff with no accountability for any air

functions. As a result, informal Capability Advisory Groups were created, with SAR included

back within the Air Mobility Advisory Group. In general, from 1968 to 2004 the "Canadian Air

Force was burdened with disjointed, often dysfunctional, C2 arrangements whose legacy

continues to plague the Canadian Air Force to this day."[231] This dysfunctionality arguably had a

great impact on the SAR system as Air Command had been the link between already

geographically dispersed squadrons and RCCs to NDHQ with regards to policy directives and

changing national requirements, while the SRR Commanders only handled regional

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[228] English, *Command & Control of Canadian Aerospace Forces: Conceptual Foundations ...,* 62-64, 71, 76.
[229] Rachel Lea Heide, "Canadian Air Operations in the New World Order," in Allan D. English, ed., *Air Campaigns in the New World Order.* Silver Dart Canadian Aerospace Studies Series, Vol 2 (Winnipeg: Centre for Defence and Security Studies, 2005), 79.
[230] Department of National Defence, Air Command, B-GA-460-000/FP-000, *Search and Rescue Operational Doctrine* (Ottawa: DND, 1995), 5-2-1; Department of National Defence, *1994 Defence White Paper* (Ottawa: Canada Communications Group, 1994), 18.
[231] English, *Command & Control of Canadian Aerospace Forces: Conceptual Foundations ...,* 73, 80.

operations.[232] The contemporary situation continues to evolve. Some advisory groups have morphed into a more executive wing construct. All tactical helicopter squadrons, regardless of location, report to 1 Wing Kington while all transport squadrons report to 8 Wing Trenton and all maritime helicopter squadrons report to 12 Wing Shearwater.[233] However, SAR remains only as an advisory group.

Since approximately two-thirds of the federal SAR incidents over the last five years were marine cases, the organizational pressures of the CCG bear some examination as well.[234] Early CCG history was noted previously with the creation of the DoT and the subsequent recognition of its marine fleet as the CCG in 1962.[235] As part of the DoT, much like Australia's AMSA, marine regulation, prevention and response efforts were within the same department and reported to the same minster. However, with efforts in the 1990s to reduce the $40 billion national deficit in 1995, at about the same time that DND underwent the MCCRT restructuring, the CCG became part of the Department of Fisheries and Oceans (DFO).[236]

At the time of transfer, all functions of the CCG except regulatory ones were transferred from DoT to the DFO, which operated fisheries and science vessels.[237] In 1987, prior to the transfer, the CCG operated Canada's largest civilian fleet consisting of 60 large ships and 250

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[232] Department of National Defence, Air Command, B-GA-460-000/FP-000, *Search and Rescue Operational Doctrine …*, 5-2-1 to 5-2-3.

[233] Royal Canadian Air Force, "Wings and Squadrons: Air Force Wings Across Canada," last modified 20 November 2015, http://www.rcaf-arc.forces.gc.ca/en/wings-squadrons.page.

[234] Department of National Defence, *Federal Search and Rescue Operational Governance Committee Annual Report 2014 …,* 21.

[235] Canadian Coast Guard, "History of the Canadian Coast Guard," last modified 22 July 2014, http://www.ccg-gcc.gc.ca/eng/CCG/History.

[236] Canadian Coast Guard, "History of the Canadian Coast Guard," last modified 22 July 2014, http://www.ccg-gcc.gc.ca/eng/CCG/History.

[237] Charles D. Maginley, "Canadian Coast Guard," in *Oxford Companion to Canadian History,* ed. Gerald Hallowell (Online version, 2004), http://www.oxfordreference.com/view/10.1093/acref/9780195415599.001.0001/acref-9780195415599-e-261.

smaller vessels; 79 of these vessels' primary mission was SAR.[238] This transfer was in some ways the culmination of fleet rationalization studies, five of which took place since the first one – the 1962 Glassco Royal Commission. The mission statement of the expanded DFO organization was "to manage Canada's oceans and major waterways so that they are clean, safe, productive and accessible; to ensure sustainable use of fisheries resources and to facilitate trade and commerce."[239] The mission statement does not reflect much SAR responsibility except perhaps in the word "safe." As could be expected, the DFO and the CCG had different fleets and cultures, so integration was difficult. Much is written about unification of the three military services; this was at least as traumatic. Marine historian Charles Maginley notes that the CCG was undergoing major adjustments as of 2002.[240] In fact a 2003 report from the Standing Committee on Fisheries and Oceans (SCOFO) titled "Safe, Secure, Sovereign: Reinventing the Canadian Coast Guard" reflected some of the changes referenced in the closing chapter of Maginley's book.

The SCOFO report recommended that the CCG be given broader control over SAR and environmental situations as it was responsible for response, but not prevention aspects. These recommendations included the establishment of the CCG as an independent agency responsible for SAR and pleasure craft safety, reporting to Transport Canada for maritime traffic and security. The government responses to these proposals were to essentially keep the current arrangement except for a compromise on some independence.[241] In 2005 the CCG was declared

[238] Transport Canada, *The Canadian Coast Guard Fleet* (Ottawa: Transport Canada Public Affairs, 1987), 1, 6-12; Canadian Coast Guard, *Canadian Coast Guard: A Tradition of Quiet Pride,* ((n.p.), 1986), Note: see Canadian Coast Guard Fleet section as the reference does not contain page #s.

[239] Charles D. Maginley, *The Canadian Coast Guard 1962-2002* (St Catherines Ontario: Vanwell, 2003), 223.

[240] Maginley, *The Canadian Coast Guard 1962-2002 …*, 224-226, 229, 232

[241] Parliament, "Government Response to the First Report of the Standing Committee on Fisheries and Oceans on the Canadian Coast Guard entitled 'Safe, Secure, Sovereign: Reinventing the Canadian Coast Guard,'" (April

a "special operating agency (SOA)" of the DFO with many of its pre-merger functions including

SAR, aids to navigation, icebreaking and marine traffic services.[242] From 1995 to 2005 the CCG

struggled to retain its identity within DFO, while much like in the CAF, SAR service at the

tactical and operational level continued.

NSS and ICSAR Achievements

Although the mid-1990s marked the beginning of rationalization period for the ICSAR

departments, it is one of two periods (1994-1995 and 2003-2005) with accessible documentation

related to the activities of the NSS.[243] A review of them provides insight that is reflective of

higher-level SAR activity.

The 1994 annual NSS report contained intentions such as the creation of a SAR Client

Council to provide a forum for information exchange with those that could reasonably be

expected to require SAR services, such as boaters, aviators, climbers, etc. Additionally, the NSS

supported the adoption of national ground SAR (GSAR) standards, the creation of a national

SAR organization directory, and the development of a national information collection system.

The data collected from CCG, DND, Parks Canada, RCMP and provincial sources was intended

to build a complete SAR picture and potentially identify gaps in SAR service.[244] Contrary to the

2013 Auditor General's report that was critical of the RCAF not adjusting posture to periods of

high demand, this 1994 report states that an NSS report titled *When and Where Incidents Occur*

resulted in 442 Squadron in Comox holding stand-by posture seven days a week from June to

2005), Recommendation # 9, last accessed 30 November 2015, http://www.parl.gc.ca/
HousePublications/Publication.aspx?DocId=1708953&Language=E&Mode=2&Parl=38&Ses=1.

[242] Canadian Coast Guard, "History of the Canadian Coast Guard," last modified 22 July 2014, http://www.ccg-gcc.gc.ca/eng/CCG/History.

[243] Note: the documentation is not publicly accessible, either through the U of T, CFC library or on line government website searches. It was made available for reference with thanks to the helpfulness of SAR colleagues who searched their electronic files at NSS.

[244] National Search and Rescue Secretariat, *Annual Report 1994-1995* (Ottawa: National SAR Secretariat, 1995), 3, 5, 8.

September 1994 to improve response times.[245] Unfortunately, nothing subsequently was stated

on the effectiveness or further direction for this initiative. As for the other initiatives, at least two

directories of Canadian Search and Rescue Organizations were produced; the SAR KMS finally

went live in 2014; a national GSAR association was formed in 1996; and a national GSAR

standard was announced in June 2015.[246]

These achievements, although realized approximately 20 years after the first intention,

shows that the desire to evolve existed, but the pace reflects either lack of resources or emphasis.

The 1995 report notes that NSS restructured in compliance with a federal government program

review.[247] The following year's report is mainly consumed with explanation of the new structure.

While the executive director noted the growing workload and the 25% reduction in staff, support

remained for the initiatives contained within the previous annual reports. The new structure

created a Federal Coordination Division as well as a Program Division. The coordination

element undertook the ICSAR Secretariat functions, while the program element produced

analysis and reports to inform SAR management functions.[248]

The 1997 annual report reflects that the Federal Coordination Division was consumed by

support to ICSAR; however the Program Division developed a SAR Response Review plan for

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[245] National Search and Rescue Secretariat, *Annual Report 1994-1995 …*, 3.

[246] National Search and Rescue Secretariat, *1996-1997 Annual Review* (Ottawa: National SAR Secretariat, 1997), 16; National Search and Rescue Secretariat, *Directory of Canadian Search and Rescue Organizations 1995 Edition* (Ottawa: National Search and Rescue Secretariat, 1995); National Search and Rescue Secretariat, "Search and Rescue Knowledge Management System (SAR KMS)," http://www.nss-snrs.gc.ca/en/knowledge-managment.page; Search and Rescue Volunteer Association of Canada (SARVAC), "History," last accessed 05 March 2016, http://sarvac.ca/about/; "Media Alert – Join CSA Group and SARVAC for the Launch of Canada's First National Standard for Ground Search and Rescue," *Canada Newswire*, 16 June 2015, http://search.proquest.com/printviewfile?accountid=9867.

[247] National Search and Rescue Secretariat, *1995-1996 Annual Review* (Ottawa: National SAR Secretariat, 1996), 2.

[248] National Search and Rescue Secretariat, *1996-1997 Annual Review …*, 2, 5-10, 12.

ICSAR approval. This annual report further noted ICSAR's intent to create a "federal SAR Prevention Vision and Objective."[249]

The SAR Response Review, which was eventually entitled *Review of SAR Response Services*, was published in 1999. The report was critical of the SAR program, noting that it was "still incoherent" and lacked a policy and planning framework. Although ICSAR allowed departments to engage in dialogue, their SAR response was departmental rather than a contribution to an overall national requirement. The lack of structure resulted in the inability to determine necessary national SAR postures, resources and training. Another finding was that although "over thirty years of attempts [had been made] to put the federal SAR program in order," ICSAR, as the advisory body, had no "evidence of issues or advice ever being passed from [ICSAR] to the [lead minster] LMSAR." Given the lack of management, the report warned that SAR could become a public policy issue.[250]

It is interesting to note that the lack of management was a recurring theme of the many reports and, as reflected in the National Defence 2002 Report on Plans and Priorities, the government again attempted to tackle the problem, this time with a Strategic Transition Initiative Project (STIP).[251] A result of the STIP was the creation of a NSS document titled Charting the Future: The Federal Search and Rescue Program Management Framework.[252] This report articulates the existence of a national "seamless SAR system" at the tactical level, but that the "ad hoc" tactical collaboration needs to be captured as a "Canadian SAR Program" framework.

[249] National Search and Rescue Secretariat, *1997-1998 Annual Review* (Ottawa: National SAR Secretariat, 1998), 8.

[250] National Search and Rescue Secretariat, *Review of SAR Response Services* (Ottawa: National Search and Rescue Secretariat, 1999), 3, 6, 7.

[251] Department of National Defence, "2002-2003 Report on Plans and Priorities," 28, 30, last accessed 13 December 2015, http://publications.gc.ca/collections/Collection/BT31-2-2003-III-57E.pdf.

[252] National Search and Rescue Secretariat, *Charting the Future: The Federal Search and Rescue Program Management Framework* June 2003, updated September 2003 (Ottawa: National SAR Secretariat, 2003), 3.

Further the report indicates the creation of an annually adjusted five-year horizon strategic

direction paper, annual reports to serve as an accountability mechanism, prescriptive MOUs to

federal departments for adherence to ICSAR strategies and recognition of the need for a

performance measurement process. Finally, the report produced a SAR Vision Statement and

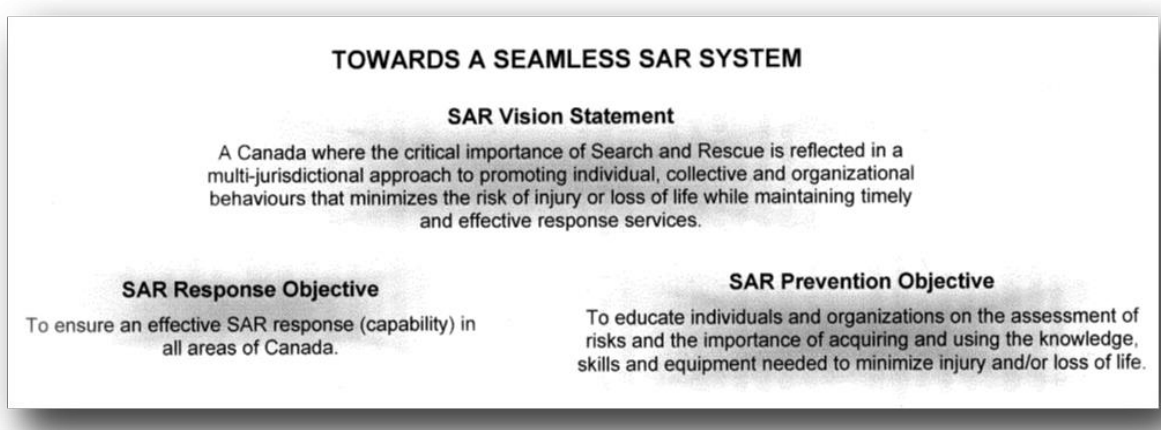SAR Response and Prevention Objectives as shown in figure 3.0.[253]

TOWARDS A SEAMLESS SAR SYSTEM

SAR Vision Statement
A Canada where the critical importance of Search and Rescue is reflected in a multi-jurisdictional approach to promoting individual, collective and organizational behaviours that minimizes the risk of injury or loss of life while maintaining timely and effective response services.

SAR Response Objective
To ensure an effective SAR response (capability) in all areas of Canada.

SAR Prevention Objective
To educate individuals and organizations on the assessment of risks and the importance of acquiring and using the knowledge, skills and equipment needed to minimize injury and/or loss of life.

Figure 3.0 – Towards a Seamless SAR System
Source: National Search and Rescue Secretariat, *Charting the Future …,* 6.

These objectives and vision set a strategic goal with accompanying objectives as well as

the beginnings of the ways and means to achieve the objectives. Only three consecutive annual

reports that immediately followed this document were located, but for the first time all were

published jointly by ICSAR and NSS. The three annual reports all included information on

overall SAR activity, including promotional and response statistics, but each report showed

aspects of progress on the SAR framework as shown below. Created completely independently,

the content of these annual reports bears uncanny resemblance to the annual reports initiated by

the CAF/CCG SAR governance committee in 2013.[254]

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[253] National Search and Rescue Secretariat, *Charting the Future …,* 4-5, 7, 9, 11.
[254] Department of National Defence. *Federal Search and Rescue Operational Governance Committee Annual Report 2013*. Canadian Joint Operations Command: file 3385-1, March 2014.

The 2003 NSS/ICSAR annual report noted that while level of service standards were necessary, both for public awareness and resource deployment considerations, a standard had yet to be defined due to different departmental approaches. This is an example whereby an independent LMSAR, or Australia's construct, may have been able to arbitrate the departmental concerns and allow progress on the issues. The report went on to define four strategic directions to guide long-term planning: seamless SAR; marine SAR; northern SAR; and volunteers.[255] The following report in 2004 related activities aligned with the above strategic directions but removed volunteers. On the marine side, it was noted that marine emergencies accounted for 76% of all federal SAR response activities and further that 70% of these were pleasure craft.[256] The observation is simply stated, without indication on whether this information would be used to target prevention activities. The report's final pages note that although ICSAR was committed to provide seamless SAR, key risks to the SAR program were changing government priorities, horizontal program management and interoperability[257] – the very same risks that, in hindsight, seem to have been a consistent risk since 1947.

The 2005 annual report was the last report for this period. Like the 2004 report, it contained no mention of progress on nationally defined SAR levels of service and no stated intentions of the actions that might follow statistical observations on SAR cases. In other words, the report was a communication mechanism but was not the envisioned concurrent accountability construct. There were two points of note within the report: another CAF's command and control

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[255] National Search and Rescue Secretariat, *Annual Report 2003 National Search and Rescue Program, Interdepartmental Committee on Search and Rescue* (Ottawa: National SAR Secretariat, 2004), 13, 20-21.
[256] National Search and Rescue Secretariat, *Annual Report 2004 National Search and Rescue Program, Interdepartmental Committee on Search and Rescue* (Ottawa: National SAR Secretariat, 2005), 14, 18.
[257] National Search and Rescue Secretariat, *Annual Report 2004 …,* 21-22.

structure Transformation[258] and an emerging Public Safety and Emergency Preparedness Canada

coordination and cooperation nexus with NSS.[259] Whether further reports were not created, or

are simply unavailable, is unknown – but 2005 was the last report that could be found.[260]

These two periods are the only ones with documentation that shows activities in the NSS

and ICSAR mirroring some of the activity undertaken by Australia. There was the intent for a

layered approach to SAR through identification of all possible responders, the creation of a

Client Council, as well as the desire to analyze statistics and improve service through strategic

objectives and directions. Although this early period, notably after 2000, started with promise

and plans for the future, the ideas from the *Review of SAR Response Services* and *Charting the*

Future appear to have lost momentum, possibly due to CAF restructuring and also CCG

restructuring, as this was the period the CCG was proclaimed a SOA, as noted previously.

The next report that spurred SAR activity with regards to SAR management (and is the

impetus for this research study), was the 2013 Auditor General's report on *Federal SAR*

Activities. The report again noted the lack of a national SAR policy and planning framework,

measures of effectiveness and a governance structure. Although some criticism was aimed at the

NSS as it has not achieved its mandate to establish a national policy framework, the report also

recommended that:

> National Defence, in consultation with Fisheries and Oceans Canada, Transport
> Canada, and other federal departments, and the provinces and territories should
> take steps to improve the governance structure, including developing objectives,
> performance indicators, and reporting that would enhance search and rescue
> service and coordination.[261]

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[258] Note: the transformation referred to in the report would have been General Hillier's CF Transformation. See: Michael K. Jeffery, *Inside Canadian Forces Transformation* (Kingston: Canadian Defence Academic Press, 2009).

[259] National Search and Rescue Secretariat, *Annual Report 2005 National Search and Rescue Program, Interdepartmental Committee on Search and Rescue* (Ottawa: National SAR Secretariat, 2006), 4, 16.

[260] Graham Newbold, "Annual Reports - Found some of them," e-mail to author 23 February 2016.

[261] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 23-24, 26.

The response to this recommendation was that:

> National Defence acknowledges that search and rescue (SAR) is a shared responsibility across all levels of government and is delivered with the support of the private/ commercial sector and volunteers. As such, effective governance and coordination among federal departments and with provinces and territories is essential … [A] recently initiated National Defence/Canadian Forces and Fisheries and Oceans/Canadian Coast Guard Search and Rescue Operational Governance Committee will work to enhance coordination of their respective federal responsibilities for aeronautical and maritime SAR activities. This, in turn, will assist overall coordination. Furthermore, National Defence/Canadian Forces, with the support of relevant federal departments, will assess the SAR governance structure at the federal level to determine whether it is optimally designed to effectively execute the SAR mandate across departments and to ensure appropriate coordination with federal-provincial and other responders.[262]

Arguably the creation of this Operational Governance Committee did nothing to bolster the existing ICSAR, even though the ICSAR seems the existing and appropriate forum for the CF to pursue its stated goal. As for ICSAR, it has only met once since 2012. It was an introductory meeting roughly three months following a government announcement on 24 July 2015 that transferred the NSS to the Minister of Public Safety and Emergency Preparedness to improve "integrated SAR capacity."[263] As this transfer is only a few months old, there is nothing to indicate how the transfer could change the SAR system.

Conclusion

Looking back over the course of the structural aspect of SAR history, one approach could be congratulatory as SAR response has persevered. However, with the absence of proper analysis of the statistical databases, whether past or present, it is also impossible to know if lives may have been lost because of a non-optimized system. Obviously, the big disasters are known – the

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[262] *Ibid.,* 25.

[263] Mike Susin, "ICSAR Meetings and any minutes or record of discussion/decisions," e-mail to author 15 December 2015; Government of Canada, "Government of Canada announces improvements to Canada's Search and Rescue system," last modified 04 July 2015, http://news.gc.ca/web/article-en.do?mthd=tp&crtr.page=1&nid= 1006749&crtr.tp1D=1. Mike Susin is a Royal Canadian Air Force Senior Analyst at the National Search and Rescue Secretariat.

Dutch freighter and the Ocean Ranger – but what about the smaller cases that lacked notoriety? Resources may still be wasted through duplication of SAR coverage, while needs that exist elsewhere go unfilled and create gaps in what could be a near seamless SAR system.

Even though committees and agencies were formed and a Lead Minister appointed – the first ICSAR in 1946, Lead Minister in 1976 and NSS in 1986 – a comprehensive plan and policy framework has proved elusive. Although exhaustively and insightfully identified in three reports since 1982 – the *Report on an Evaluation of Search and Rescue,* the *Royal Commission on the Ocean Ranger Marine Disaster*, and the *Review of SAR Response Services* – a national plan still does not exist. The extent that government and departmental restructuring and prioritizing impacted the inability to follow through on initiatives is not documented but it must have had some effect, as both the CCG and DND have undergone changes. Arguably, the more frequent changes within DND bear the greater blame on the inability to move forward given the lead coordination responsibility. Though coordination by committee would be challenging, a consistent, committed and documented approach could realize results, especially once a Lead Minister had been appointed.

From the first beginnings of an organized SAR system, the government intended a co-operative, cross-jurisdictional approach in order to use existing services – first federal resources then extended to include provincial, volunteer and commercial resources as well. Thus far, the inability of the departments that make up ICSAR, as well as the NSS, to create a national SAR plan and policy has stifled full realization of this forward thinking and practical vision of 1947 – an achievement that Australia has managed to reach in a shorter period of time. Arguably, the most promising steps were taken in the late 90s and early 2000s but the current absence of the products cited in *Charting the Future* speaks to their demise.

That is not to say that Canada's SAR system is poor, but with all the available resources, both the effectiveness and efficiency could be optimized. Perhaps this could be achieved by governance, but it is still most essential to have a framework that links disparate resources into a deliberate networked response – a framework, such as Australia's, that has defined plans and policies from which to drive and measure their SAR delivery. Considerations and opportunities to finally realize this goal is the topic of the next chapter.

Chapter 4 – ORGANIZATIONAL ELEMENTS OF A SAR FRAMEWORK

In spite of the many reports and recommendations for a national SAR policy, we found that there is still no such policy nor an overall federal policy, planning framework, clear statement of expectations for federal SAR services, or ability to measure overall federal SAR effectiveness. The national SAR system involves federal, provincial, and territorial organizations, so the development of a policy framework would need to include all of these stakeholders. The National Search and Rescue Secretariat (NSS) has made efforts over the years to establish a policy and governance framework, but it has not been successful. [264]

- Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities*
…, 23.

Introduction

Situating SAR in light of international obligations, Australia's approach and Canada's SAR evolution demonstrate the inherent interconnectedness in a national SAR system. The purpose of this chapter is to propose considerations for a collaborative, geographically dispersed, organizationally diverse, responsive, national SAR system. Considerations that weave the above challenges and advantages into an effective and efficient SAR system that delivers lifesaving SAR service to Canadians and other citizens within Canada's responsibility. Key is a structure that could develop the *ways* to connect the SAR objectives (*ends*) with the response resources (*means*).

The intent of this chapter is not to provide an in depth analysis of organizational structures or the CAF structure. [265] Rather, it is first to present contemporary models arguably best suited to the SAR organization and the measurement of that program, given that international conventions note the need for cooperation and continuous improvement. Secondly, it is to acknowledge technology and existing government structures that could easily be applied

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[264] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 23.

[265] Kevin Grieve, "The Current Command and Control Structure for the RCAF's Aeronautical Search and Rescue: A Proper Enabler," (Joint Command and Staff Program Paper, Canadian Forces College, 2014). Note: this paper provides a detailed explanation of CAF C2 Structure.

to the SAR system to improve interagency, cross-jurisdictional relationships and thus improve effectiveness and efficiency. The goal of a national SAR system is to save lives. Overly simplistic accountability arguably promotes silos, impeding the very policies and plans required to realize this goal, whereas building organizational identity, measuring relevant performance and leveraging existing linkages may actually facilitate establishment of these elusive plans.

Type of Organization

The Auditor General's report on SAR notes "that roles and responsibilities are clear at the operational level"[266] and so this is an aspect that should be preserved. Recognizing the diversity and time critical nature of SAR incidents dictates an information construct, which is essential for a system comprised of multiple clients.[267] Finally, there would be no argument that interoperability and awareness are a fundamental aspect of a cross-jurisdictional SAR system. These facets are all addressed by the previously noted emerging organizational theory articulated in a 2003 book by David Alberts and Richard Hayes, *Power to the Edge*.[268] It is no accident that this philosophy emerged after 9/11, when the complexity of problems transcended the capacity of any single department to manage. Arguably, the SAR system has dealt with this cross-jurisdictional aspect since inception, but now recognition of whole of government (WoG) need has provided solutions for SAR's Achilles's heel.

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[266] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …*, 2. Note: the OAG references to the operational level are aimed at the SAR responders – something the CAF would consider the tactical level, recognizing that there is a spectrum from operational to tactical and some argue the non-existence of an operational level.

[267] Simon Page, "Command and Control for the Transformed Canadian Forces: A Grand Strategy," (Joint Command and Staff Program Master of Defence Studies, Canadian Forces College, 2006), 54. Note: this paper proposes a grand command and control (C2) strategy for the CAF and draws together many contemporary C2 challenges along with the conclusion that a new agile C2 construct based upon an edge organization is required to respond to the contemporary challenges posed by today's complex cross jurisdictional missions.

[268] Alberts and Hayes, *Power to the Edge: Command, Control in the Information Age …,* 7.

Power to the Edge leverages current network technology to share information and synchronize activity. This allows dynamic resource assignment as well as control exercised through shared intent. Unlike hierarchical structures, which "spawn stovepipes," an edge organization encourages interaction at all levels and loyalty to the "overall enterprise."[269] An edge organization is graphically depicted in Figure 4.0.
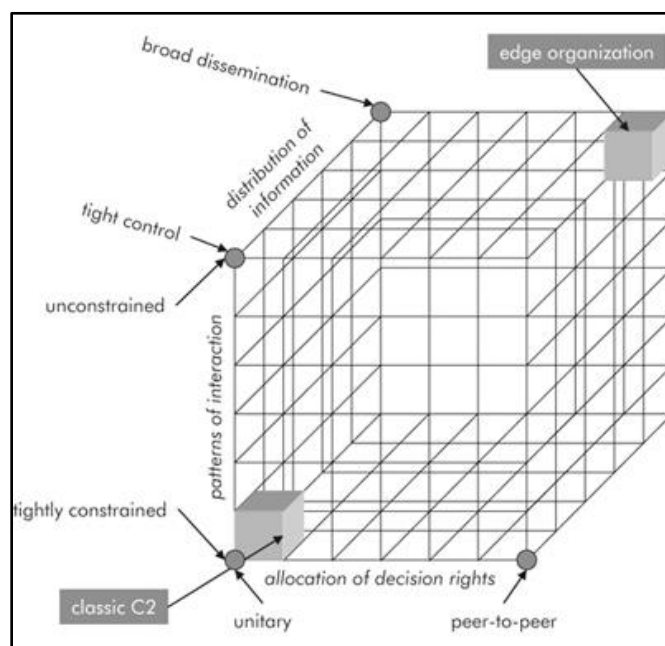

Figure 4.0 – Command and Control Approach Space
Source: David Alberts, "Agility, Focus, and Convergence: The Future of Command and Control." *The International C2 Journal* 1, no. 1 (2007): 9, fig., 1.

At the tactical level unconstrained peer-to-peer information sharing occurs during SAR operations – an edge organization would conceivably define the "seamless SAR system at the tactical level"[270] as described in chapter 3.

Committing to an edge organization at the strategic and highest operational levels would remove barriers, as edge organizations are inherently collaborative, eliminate stovepipes and

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[269] Alberts and Hayes, *Power to the Edge: Command, Control in the Information Age ...,* 5-6, 8, 216-217.
[270] National Search and Rescue Secretariat, *Charting the Future …*, 6.

produce loyalty to their (SAR) enterprise.[271] As noted in the Auditor General's report
"[c]ooperation and collaboration are essential to the success of SAR activities, especially
considering Canada's size, topography, and climate."[272] Stovepipes act as barriers and allow
"fiefdoms" to diminish organizational coherency, inhibit information flow and restrict asset
sharing.[273] An edge organization is a constrained variant of a complex adaptive system (CAS),
both of which are effects based and relevant to WoG situation management.[274] A 2011 DRDC
organizational research project further supports this approach, suggesting that multi-disciplinary
and government led comprehensive approaches using a constrained CAS framework likely best
enable meta-organizational effectiveness.[275]

The value created from a more collaborative collection of diverse entities also raises fears
that accountability will be reduced.[276] Given that there appears to have been little accountability
for the establishment of SAR plans and policies throughout its history, the information sharing
aspect could actually improve the accountability situation. As Alberts and Hayes note:

> If anything, it [would] be easier to hold individuals accountable for their actions
> because there would be greater shared understanding of the situation than ever

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[271] Alberts and Hayes, *Power to the Edge: Command, Control in the Information Age ...,* 176-177, 217.

[272] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities …,* 1.

[273] Alberts and Hayes, *Power to the Edge: Command, Control in the Information Age ...,* 174; Allan English and John Westrop, *Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations* (Trenton: Canadian Forces Aerospace Warfare Centre, 2007), 156-157; Richard Goette and Bill March, "Transforming Canada's Post-Cold War Air Force," prepared for *The Transformation of Western Air Power*, edited by Gary Schaub, Jr. (Unpublished), 3. English and Westrop note that community stovepipes have presented a persistent challenge to Air Force Leadership while Goette and March note that the Air Force institution has suffered because of self-focused operational communities.

[274] Richard Goette, "Theoretical Approaches to Command." (Lecture, Canadian Forces College, Toronto, On, 25 November 2015), with permission.

[275] Alan Okros, John Verdun and Paul Chouinard, "Complex Adaptive Systems," in *The Meta-Organization* (Toronto, ON: Defence Research and Development Canada, 2011), i, 70.

[276] David S Alberts, "Agility, Focus, and Convergence: The Future of Command and Control," *The International C2 Journal* 1, no. 1 (2007): 22, 27.

before. This includes an understanding of command intent, assigned resources,
rules of engagement and the status of one's assets.[277]

Such an information sharing tactic was evident by Australia's production of numerous detailed and accessible reports as well as their public portrayal of a performance oriented, risk-based, approach to SAR delivery.

Performance Measurement

While the technology to gather, analyze and share information did not exist in 1946, the opportunities currently exist to leverage its power and therefore make an organizational leap into an edge organization which dynamically manages all facets of situations. Information, however, is just data without an analysis that creates understanding. In turn, crucial to understanding is the role of measurement.[278]

Measurement of something as complex as delivery of a lifesaving service is not straightforward. A research project conducted by Michael Eburn and Stephen Dovers of the Australian National University (ANU) attempted to define measures of success in Australia's fire and emergency management sector. They noted:

> The emergency environment is dynamic, fast moving and unpredictable. An unpredictable variable is human behaviour. People will make decisions that will turn out to be wrong in the circumstances … and deaths will follow. It follows that loss of life is a tragedy that the services seek to avoid, but the fact that people die during a bushfire or flood does not necessarily represent a failure by the emergency services.[279]

The study also noted that, if unchecked, measurements could default to measuring that which was simply the easiest to capture. Such measurements would be narrowly focused on the

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[277] Alberts and Hayes, *Power to the Edge: Command, Control in the Information Age ...,* 209.
[278] *Ibid.,* 235.
[279] Michael Eburn and Stephen Dovers, "Mainstreaming fire and emergency management across legal and policy sectors: Preliminary findings on measures of success," Refereed Article, *Australia Journal of Emergency Management* 27, no. 2 (2012): 16, https://ajem.infoservices.com.au/items/AJEM-27-02-05.

responders (response times, staffing and funding) and of questionable broader system value derived from other impinging factors (infrastructure design, interagency planning and communication).[280]

The easy measurements are exactly the type of default measurements undertaken by the CF and the CCG that were listed in the Auditor General's report: reaction time, crewing levels, and equipment (funding).[281] In contrast, the AMSA reports look at data to identify trends and the measurement of activities aligned with objectives. They include inspections and prevention activities which are then captured statistically and through analysis the effectiveness in reducing incidents is determined.

The ANU study provides support for a wider form of measurement such as provided by the Balanced Scorecard, a method developed by Robert Kaplan and David Norton of the Harvard Business School. This method "provides a framework for selecting multiple performance measures that supplement traditional financial measures with operating measures of customer satisfaction, internal processes, and learning and growth activities."[282] Although initially developed for businesses, the Balanced Scorecard has been adapted to not-for-profit and government agencies. The adaptation involves replacing the profit led business enterprise with a "higher purpose" mission aspiration such as "to increase public safety."[283]

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[280] Eburn and Dovers, "Mainstreaming fire and emergency management …, 17.

[281] Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities* …, iii, 2.

[282]Rajiv D. Banker, Hsihui Chang, and Mina J. Pizzini, "The Balanced Scorecard: Judgmental Effects of Performance Measures Linked to Strategy," *The Accounting Review* 79, no. 1 (January 2004): 1, http://www.aaajournals.org/doi/abs/10.2308/accr.2004.79.1.1.

[283] Paul Niven, *Balanced Scorecard Step-by-Step: Maximizing Performance and Maintaining Results* (New York: John Wiley and sons, 2002), 294; Paul Niven, *Balanced Scorecard: Step-by-Step for Government and Nonprofit Agencies* (New Jersey: John Wiley and sons, 2002), 33.

The value of the Balanced Scorecard is the "concept of cause and effect linkages."[284] Sole reliance on financial measures discourages forward thinking and reinforces functional silos – all negative aspects that have been noted in SAR evaluations, most recently the Ocean Ranger disaster.[285] The Scorecard allows flexibility for policy to determine measurement areas.[286] Possible equivalent SAR measurements could be: customer satisfaction = persons in distress; internal processes = statistical analysis; and, learning and growth = prevention and preparedness. A final example supporting the need for comprehensive SAR performance measurements is again from the Ocean Ranger disaster:

> The number of clients to be served will be influenced by the density of the population and the concentration of activities … [but] an appropriate weighting system must, however, be devised…to assess the hazard to life associated with each incident … The manner in which statistical data have been assembled, correlated and analyzed contributes to invalid conclusions and does not provide a rational or trustworthy basis for decisions regarding the deployment of limited resources.[287]

As strategy is central to the Scorecard, but government organizations "have a difficult time cultivating a clear and concise strategy,"[288] it is plausible that this measurement system may help create the elusive policy and plan framework that the NSS was envisioned to provide. Whatever the challenges to an integrated SAR program, it is of overriding importance to consider that it is the *combination* of many factors that ensures "the wait for rescue may not be a hopeless prelude to death."[289]

Public Safety Canada

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[284] Niven, *Balanced Scorecard Step-by-Step: Maximizing Performance ...,* xii.

[285] Niven, *Balanced Scorecard Step-by-Step: Maximizing Performance ...,* 6-7; Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore ...,* 109.

[286] Niven, *Balanced Scorecard: Step-by-Step for Government and Nonprofit ...,* 34.

[287] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore ...,* 119.

[288] Niven, *Balanced Scorecard Step-by-Step: Maximizing Performance ...,* 297.

[289] Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore ...,* 124.

There are now more opportunities than ever to create an integrated SAR program. The post 9/11 landscape, in addition to popularizing the mindset for WoG approaches, saw the creation of Public Safety Canada in 2003.[290] The *Emergency Management Act* empowers the Minster of Public Safety to coordinate "emergency management activities among government institutions and in cooperation with the provinces and other entities." Although SAR was not explicitly stated in the Public Safety mandate of keeping Canadians safe from risks – such as "natural disasters, crime and terrorism" – the essence is captured within the intent to protect from natural, human-caused and technological hazards.[291]

Public Safety maintains partnerships with other federal, provincial, territorial (FPT) first responder and volunteer organizations – a partnership formalized through the Emergency Management Framework (the Framework).[292] The fact that NSS was transferred to Public Safety last year could provide the "arm's length" oversight of SAR first suggested by the *ROESAR* and finally allow NSS to develop plans and policies.[293] At the same time, a common emergency response milieu framework would allow agencies to interact during the day-to-day SAR emergencies thus providing familiarity when responding to other emergencies.

However, an independent internal audit of emergency management identified that Public Safety also has challenges. The audit noted the need for strengthened governance, improved strategic planning and performance management and prioritized resource allocation based upon

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[290] David S. McDonough, *Canada's National Security in the Post-9/11 World: Strategy, Interests, and Threats* (Toronto: University of Toronto Press, 2012), 100.

[291] Department of Justice, *Emergency Management Act*, http://laws-lois.justice.gc.ca/eng/acts/E-4.56/page-1.html; Public Safety Canada, "Emergency Management," last modified 01 December 2015, http://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/index-en.aspx; Public Safety Canada, "About Public Safety Canada," last modified 27 July 2015, http://www.publicsafety.gc.ca/cnt/bt/index-en.aspx.

[292] Public Safety Canada, "Emergency Management," http://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/index-en.aspx; Public Safety Canada, "Emergency Management Framework for Canada," last modified 15 December 2015, http://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/mrgnc-mngmnt-frmwrk/index-eng.aspx.

[293] Cabinet. Committee on Foreign and Defence Policy, *Report on an Evaluation of Search and Rescue ...,* 342, 402 – 403.

areas of risk. The audit also noted Public Safety's lack of "direction-setting" for government-wide emergency management plans and the need to improve these plans "from an efficiency and effectiveness perspective." The Public Safety departmental response was to accept the findings, cognizant of the audit's warnings that constant reorganization was a detriment to the department.[294]

Although Public Safety is working through many of the same challenges as NSS, it is still conceptually the right organization for NSS based upon past SAR evaluations. Drawing upon ICSAR experience, and what would now be considered horizontal initiatives,[295] perhaps NSS could advance the challenges facing Public Safety. In return, NSS benefits from established Public Safety's linkages and economy of effort. It makes sense to have effectiveness and efficiency at the strategic emergency management level as well as the operational and tactical level of emergency response.

The Federal Emergency Response Plan (FERP) formalizes institutional linkages in order to reduce duplication and harmonize with federal, provincial, territorial and other organizations. Although the FERP has many strategic objectives, it contains the core SAR objectives to save lives, reduce injury and protect the environment while recognizing the place for detailed departmental plans.[296] The FERP mindset brings to SAR the commitment to a risk-based

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[294] Public Safety Canada, *Internal Audit of Emergency Management Planning: Leadership & Oversight,* Wind Reach Consulting Services (January 2014), i, ii, iv, vi, http://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/ ntrnldt-mrgncy-mngmnt-plnnng/ntrnldt-mrgncy-mngmnt-plnnng-eng.pdf.

[295] Note: Horizontal Initiative is when two or more organizations establish a formal agreement to work toward a shared outcome. See Treasury Board of Canada Secretariat, "Horizontal Initiatives Database," last modified 30 November 2015, https://www.tbs-sct.gc.ca/hidb-bdih/home-accueil-eng.aspx.

[296] Public Safety Canada, *Federal Emergency Response Plan,* (January 2011)*,* 1-3, https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/mrgnc-rspns-pln/mrgnc-rspns-pln-eng.pdf; DND/CCG, *Canadian Aeronautical and Maritime Search and Rescue Manual …*, 1.01 page 1 of 2.

approach to operations. The plan's intent is to identify and address gaps and, with a coherent network of all agencies, assess ways to effectively and efficiently mitigate gaps.[297]

The Public Safety link with NSS would address the ICAO Annex 12 and the ICMSAR requirement to have a legal structure with links to domestic and international agencies, while the FERP would empower processes to improve SAR provision. Such an approach could assess and mitigate necessary SAR coverage in Canada and provide the Arctic with residual risk equal to anywhere else in Canada – similar to Australia's risk-based based approach. Additionally, the association of SAR with Public Safety could enhance all interagency coordination through the thousands of SAR cases that JRCC coordinates per year.[298]

MSOC / JRCC Situational Awareness

In order to conduct valid risk assessments, situational awareness is critical.[299] Following 9/11, Maritime Security Operations Centres (MSOCs) were established in Victoria and Halifax with representation "from the RCMP, CBSA [Canada Border Services Agency], TC, and the CCG."[300] As the SRR Commanders of Halifax and Victoria are also responsible for the MSOCs, and the representatives in the MSOCs are also agencies within ICSAR, there is an inherent efficiency and effectiveness for the RCCs to synchronize with the MSOCs. This would realize operational effectiveness from a daily interagency working perspective, a technology and information sharing perspective and arguably even a national security perspective – given that broad SAR awareness might connect missing pieces of a larger plot.

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[297] Public Safety Canada, "Emergency Management," last modified 01 December 2015, http://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/index-en.aspx; Public Safety Canada, *Federal Emergency Response Plan* …, 2, 14.

[298] Department of National Defence, *Federal Search and Rescue Operational Governance Committee Annual Report 2014* (Canadian Joint Operations Command: file 3385-1, March 2015), 20. Note: this report notes the breakdown of SAR cases by region including sub-centres. The report shows a five range from just over 9,000 to just over 10,000 cases per year.

[299] Public Safety Canada, *Federal Emergency Response Plan* …, 13.

[300] McDonough, *Canada's National Security in the Post-9/11 World* …, 107.

An example of this is a 2014 SAR case where illicit activity resulted in a SAR system response.[301] Although the local RCMP were advised of the suspicious circumstances, the ability to make the connections, that would have been available by federal linkages at the co-located MSOC, was missing. In that case criminals went free; in another case terrorism might go unchecked. Future possibilities could see ICSAR departments use their MSOC representative to access search or survival SAR expertise. Such synergy would avoid duplication of resources while information sharing and building common operating pictures to ensure effective and efficient responses – for this paper's purpose, SAR. This type of multi-agency approach was almost the government's exact response to one of the SCOFO's recommendations for granting the CCG more authority:

> The key to a successful Canadian solution to addressing on water and surveillance gaps is an approach that harnesses current capabilities and builds on the strength and expertise of each member of the federal maritime security team in order to maximize efficiencies and economies of scope while reducing the possibility of redundancies and the potential for unclear or overlapping mandates. The Government favours a streamlined multi-agency approach to maritime safety and security. A collaborative approach allows each department or agency to focus on existing roles, responsibilities and leverage on existing strengths. This approach avoids creating potentially redundant mandates for various departments, providing clarity to specific departmental roles in maritime security as well as encouraging the effective and efficient use of funding to achieve maritime security objectives thought the avoidance of any duplication efforts.[302]

Granted, JRCC Trenton is not co-located with an MSOC, but that should not negate leveraging the coastal geographical efficiencies.

In addition to federal level integration, leveraging current technology to provide situational awareness for designated SAR units could take the form of satellite tracking. Those

[301] Katie DeRosa, "Cocaine, boat seized on west coast of Vancouver Island," *Times Colonist,* last modified 17 September 2014, http://www.timescolonist.com/news/local/cocaine-boat-seized-on-west-coast-of-vancouver-island-1.1377703.

[302] Parliament, "Government Response to the First Report of the Standing Committee on Fisheries and Oceans on the Canadian Coast Guard entitled 'Safe, Secure, Sovereign …,'" Recommendation # 15.

units that wish to register as a designated resource could provide JRCC access to their real time location. The British Columbia Wildfire Services uses this system both for active fires and awareness of closest suitable resource to respond to new sightings. Much like SAR, the forest service aims to extinguish fires as quickly as possible and commercial companies make themselves available for this tasking.[303]

Conclusion

That the SAR system has endured without a framework is a testament to the likelihood that is inherently adaptive at the operational level. If this quality was accepted at higher organizational levels and enhanced through a Balanced Scorecard performance measurement approach, perhaps the necessary accountability for the institution of plans and policies would finally follow. Although this is generally a backward way of describing an organization, the necessary speed of SAR response makes the organization more accepting of a bottom up approach. While governance is a term that is frequently cited, as chapter 3 has shown, SAR has survived in spite of minimalist governance.

Australia and Canada have many similar elements; notably that SAR is delivered through multiple resources and agencies. While Australia is ultimately headed by a single ministry, the recent movement of NSS to Public Safety provides some similar hierarchical effects. Nonetheless, this chapter has shown that it is likely not simply reporting hierarchy, but also the plans, policies, information sharing and performance measurement that contributes to Australia aligning and benefiting from such diversity.

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[303] BC Wildfire Service, "Automated Flight Following," last accessed 17 March 2016, http://bcwildfire.ca/fightingwildfire/aviation/AFF/; "AFF Item Addition," http://bcwildfire.ca/ fightingwildfire/aviation/aff/addaircraft2.htm; "Fighting Wildfire," http://bcwildfire.ca/FightingWildfire/.

As part of risk-based approach, a framework of plans and policies is still necessary to ensure there are no gaps in SAR coverage and that national obligations and Canadian expectations are met. Multiple means, leveraged through established linkages, can then be dynamically managed as part of risk-based approach to SAR response. NSS may now have the independence to finally develop this plan and policy framework that will define ways to meet the national SAR objective and then use transparency of information sharing, along with the cause and effect measurements of the Balanced Scorecard, to finally realize an effective and efficient national SAR system.

CONCLUSION

The stubborn fact remains, however, that no single agency for developing, implementing and controlling a national SAR program is yet in place. There is no single functioning agency with the mandate to knit together the several components into a comprehensive SAR program.

> \- Government of Canada, *Royal Commission on the Ocean Ranger Marine Disaster*, *Report two: safety offshore ...,* 122.

The departments do not have a common set of principles for coordinating with other levels of government on national matters. In addition, the National Search and Rescue Secretariat has not implemented its 1986 mandate to establish a national policy framework, nor does it have the ability to measure overall federal program performance.

> \- Office of the Auditor General, *Chapter 7: Federal Search and Rescue Activities* …, 2.

This paper stepped through international obligations, examined another country's SAR program, reviewed the evolution of Canada's SAR system, and presented considerations to create a framework for an effective, efficient, and sustainable Canadian SAR program. Concurrently, opportunity was taken to provide real-life examples for how this applied or would improve Canada's SAR system.

The study set out to argue that a comprehensive, risk-based plan and policy framework with deliberate multipurpose and cross-jurisdictional resource capabilities would optimize the effectiveness and efficiency of this lifesaving service and provide a sustainable national SAR system. What the study found is that an integrated, multipurpose, national SAR system, supported by a SAR framework, is already endorsed by international SAR organizations. Such a system is what the government envisioned approximately 70 years ago, but the needed plan and policy framework to manage such a system – first clearly identified in 1976, reiterated in 1986, and most recently reinforced in 2013 – has remained elusive.

Chapter one illustrated that while Canada's SAR system meets most of the operational elements of international recommendations and standards, Canada's Auditor General dispensed a grade of adequate. Full integration that would bring multiple resource options to bear and improve Canada's mark, as chapter three demonstrates, has been hindered by departmentalized versus national SAR delivery. This is in sharp contrast to the situation in Australia.

Chapter two suggested that Australia's SAR system was truly robust, national and integrated. Their SAR plan designates the federal, territorial, private and volunteer resources able to respond to SAR incidents and also uses a risk-based approach to identify and mitigate known events affecting their SAR objectives. Additionally, performance is measured in order to determine areas for improvement – thus meeting an international recommendation for processes to improve SAR services. While Canada's system, as chapter three demonstrated, has many of the same functions as Australia's, it is most obviously missing the plan and policy framework to connect the SAR objective to the multitude of national resources in a coherent manner.

Chapter three also showed that, although Canada has attempted to establish a framework, it has proved elusive. However, adoption of Australia's risk-based and performance measured SAR system would benefit Canada's national SAR system, as all regions would be assessed, measured and mitigated through an appropriate combination of regulation, education and resources. Such a deliberate and documented national approach would palliate segmented SAR delivery, deliver equitable service to Canada's entire SAR area of responsibility, and provide necessary transparency for public education and confidence in the SAR system.

Segmented and departmentalized SAR delivery has frequently been identified as a downfall of Canada's SAR system. Chapter three noted that steps taken to address this

shortcoming mainly involved identification of responsible entities. Each time this responsibility was reassigned (first to ICSAR and then NSS, all under the MND as Lead Minister) the result fell short of establishing the envisioned comprehensive national SAR system. Achievement of this system was also impeded by periods of lost RCAF organizational identity due to CAF restructuring. Additionally, this early attempt at a horizontal initiative suffered from the same findings as the most recent Public Safety audit – that although the network of linkages are essential, there must still be a plan and policy framework to knit the components together.[304] Therefore, chapter four presented considerations on how to recognize the inherent characteristics of the diverse construct envisioned to be Canada's national SAR system.

Considerations would involve recognition of a national SAR identity and leveraging current technology to establish a knowledge based, information sharing, SAR organization. Along with careful selection of system performance measures, such a construct would defend against recurrent departmentalized entrenchment. This approach, combined with current NSS linkages to formal federal, provincial, territorial, private and volunteer agencies through the ministry of Public Safety, may finally realize the national SAR system envisioned for the last 70 years.

The RCAF and indeed the CAF still has a role to play. As originally envisioned, a SAR system can be established using existing resources that can be quickly mobilized. Along with other first responders, CAF members have a passion to assist those in need; at the organizational level, a mandate to protect Canadians. A nationally integrated plan and policy framework would not only allow a more efficient and effective SAR response, but also permit sustainable, multipurpose employment of CAF resources only where and when needed.

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[304] Public Safety Canada, *Internal Audit of Emergency Management Planning* …, ii.

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