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Risk Based Analysis of Maritime SAR Delivery



Safety First, Service Always



Risk Based Analysis of Maritime SAR Delivery
CCG/GCC

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1 INTRODUCTION

1.1 GENERAL

The Government of Canada has accepted overall responsibility for maritime search and rescue (SAR) response within Canada under international agreements. It has assigned the Canadian Coast Guard (CCG) the role of coordinating maritime SAR response on its behalf and providing dedicated, on-water response capabilities, while mandating that all federal vessels and aircraft are available for SAR response tasking as appropriate to their capabilities.

CCG coordinates and delivers on-water response to maritime SAR incidents via a coordinated aeronautical and maritime SAR system operated in conjunction with the Royal Canadian Air Force (RCAF), which has been mandated by the Government to provide dedicated aircraft and crews to respond to maritime SAR incidents. Some aspects of this SAR system, such as the three Joint Rescue Coordination Centres (JRCCs), are formally funded, established and operated by the CCG and RCAF, while other aspects involve service contributions and the participation of partner agencies and organizations, as well as entities and individuals active in the Canadian maritime environment.

This Risk Based Analysis of Maritime Search and Rescue Delivery (RAMSARD) Manual is intended solely for use in examining maritime SAR response delivery by CCG in conjunction with SAR partners, be they formally-acknowledged members of the maritime SAR system or resources of opportunity involved primarily due to their proximity to an incident location, their availability or their capability to provide necessary assistance. The Manual's sole focus is on the delivery of the SAR response itself, via vessels and aircraft of the CCG, RCAF, other agencies and organizations, and resources of opportunity. It is neither designed nor intended to examine or assess other aspects of SAR, such as prevention programs, regulation or enforcement services delivered by organizations and agencies external to CCG, nor is it intended to examine communications and coordination of maritime SAR response.

Nevertheless, these other aspects often impact the adequacy and effectiveness of risk mitigation measures provided through CCG SAR response. Where such is the case in the course of applying the analysis processes in this Manual, these impacts will be noted and recommendations for their mitigation will be included. Such mitigation may require senior management engagement with other federal departments and agencies or non-federal organizations to seek their cooperation in the application of risk mitigation measures.

1.2 PREVENTION AND PREPAREDNESS

A series of choices, decisions, challenges, actions and inaction exists before a maritime SAR incident occurs, placing lives at risk and requiring some form of SAR response services to resolve the incident. These also include multiple opportunities, or decision points where individuals who may become the victims of a maritime SAR incident have the ability to influence whether or not they become involved in a SAR incident in the first place (SAR prevention) or, should they become involved in a SAR incident, whether or not they are most likely to survive the experience (SAR preparedness).

Except a decision not to undertake activities in the maritime environment altogether, no single decision is 100% effective in avoiding the occurrence of a maritime SAR incident or ensuring survival should one occur. Collectively, however, the results of sound decision-making by mariners will afford the greatest likelihood of positive outcomes to their maritime activities.

CCG is neither funded nor mandated to directly promote maritime safety, impose or enforce maritime safety regulations, or educate individuals regarding decisions and actions to prevent maritime SAR incidents. Along with its SAR response mandate and as delivered through its volunteer component (the Canadian Coast Guard Auxiliary [CCGA]), CCG funds activities within marine communities to promote awareness, decisions and actions on the part of individuals to equip and prepare themselves to quickly alert authorities of incidents and their location, and to survive for as long as possible until assistance (SAR response) arrives.

Thus, CCG and other SAR responders are in the difficult position of acting as the last resort for those who find themselves the victims of a maritime SAR incident. At each decision point leading to a maritime SAR incident, decisions made and actions taken (or not taken) add to the uncontrolled variables with which SAR responders have to deal with in order to save lives. By themselves, the sea, the weather, the vastness of the ocean environment and the proximity of physical hazards all pose daunting challenges to responders in the maritime environment. These challenges are only magnified by the results of lack of prevention and preparedness to survive on the part of potential victims. As an unfortunate consequence, not all lives can or will be saved.

While the intent of the RAMSARD analysis process is solely to examine the actual maritime SAR incidents, it is essential to bear in mind the influences and impacts leading up to the incidents themselves when measuring and considering means of enhancing the effectiveness of SAR response.

1.3 AN INTEGRATED APPROACH TO RISK MANAGEMENT

The RAMSARD Manual is consistent with the principles and processes contained within the Canadian Standards Association's (CSA) standard Q850-97, Risk Management: Guidelines for Decision-Makers. This publication is recognized internationally and has been adopted departmentally as the basis for risk management practices. The RAMSARD methodology is designed to:

- Provide a structured process for identifying, analyzing, evaluating and documenting risks in a consistent manner across the SAR system;
- Provide a process for evaluating current maritime SAR response capability and capacity in terms of efficiency and effectiveness in mitigating risks in the maritime environment; and
- Provide a process for identifying and evaluating alternative resource configurations.

As such, the RAMSARD manual supports an integrated approach to risk management and decision-making.

1.4 BENEFITS OF AN INTEGRATED APPROACH TO RISK MANAGEMENT WITHIN CCG

The objective of this process is to apply more systematic risk management decision-making throughout the organization.

Use of a systematic approach will generate benefits for CCG such as:

- A more systematic approach will support a more effective allocation of SAR resources.
- An integrated approach will help CCG manage risks more effectively, more systematically and with greater consistency.
- Incorporating more systematic risk management decision-making will enable CCG to better achieve its objectives.
- This approach also enables CCG to identify and respond effectively to perceptions of risk on the part of stakeholders, the general public and other government agencies.

- Use of a structured decision-making process based on an explicit consideration of risk will enable CCG to better meet its social and legal responsibilities.
- An integrated approach provides direction through an agreed upon vision and a set of common principles.
- The approach helps to demonstrate due diligence in carrying out the mandate of the CCG.
- Proper documentation of the RAMSARD risk management process aids in our decisions if required.
- A systematic process lends itself to continuous improvement, while an intuitive approach does not.
- Decisions based on a systematic decision framework are considered more acceptable and have greater credibility than those arising from intuitive approaches.
- The adoption of a more systematic approach to risk management decision-making addresses issues raised by the Office of the Auditor General.

2 A PRIMER ON RISK MANAGEMENT AND DECISION-MAKING

Before describing the processes of risk management and decision-making that form the basis of the RAMSARD Manual, an introduction to the basics of risk management and how it supports decision-making will assist in understanding the methodology.

Here are some key definitions of terms commonly used in risk management, which are consistent with the CSA Standard Q850:

Decision-Maker - a person or group with the power or authority to make decisions.

Hazard - a source of potential harm, or a situation with a potential for causing harm, in terms of human injury, damage to health, property, the environment, and other things of value, or some combination of these.

Loss - an injury or damage to health, property, the environment, or something else of value.

Residual Risk - the risk remaining after all risk control strategies have been applied.

Risk - the chance of injury or loss as defined as a measure of the probability and severity of an adverse effect to health, property, the environment, or other things of value.

Risk Analysis - the systematic use of information to identify hazards and estimate the chance for, and severity of, injury or loss.

Risk Assessment - the overall process of risk analysis and risk evaluation.

Risk Communication - a set of communication and consultation activities designed to support the decision-making process by providing information necessary for defining stakeholder issues and for understanding the trade-offs inherent in the decision situation.

Risk Evaluation - the process by which risks are examined in terms of cost and benefits, and evaluated in terms of their acceptability considering the needs, issues, and concerns of stakeholders.

Risk Management - the systematic application of management policies, procedures and practices to the task of analyzing, evaluating, controlling, and communicating about risk issues.

Stakeholder - any individual, group, or organization able to affect, be affected by, or that believes it might be affected by, a decision or activity. The decision-maker(s) is also a stakeholder. SAR stakeholders belong to one of two distinct groups: partners, who work with CCG to support and/or deliver SAR services; and clients, who are the potential recipients of SAR response services.

2.1 INTRODUCTION TO RISK MANAGEMENT

More and more, government and private sector organizations are embracing a more systematic approach to risk management. This new interest results partially from an increased call for accountability at all working levels, but it also reflects a need to work more effectively with fewer available resources to carry out the required workload. "Doing less with less" is becoming more the norm in these economic times. A more systematic approach to decision-making will help CCG make better decisions about how it does its business.

Risk management, however, is not something new; we all use some form of risk management decision-making in our day-to-day lives, be it intuitive or structured. For example; each day we seek to minimize the risks posed by the weather we get up and we define our objectives (e.g. do we care if we get wet, do we wish to avoid overexposure to sunlight and the attending cancer risk; we then read the paper or listen to the radio (risk communication) for the current forecast to identify impending weather and its associated risks. Based on this information, we make judgements about the likelihood and consequences of adverse weather events and then, based on our objectives, we make decisions. We evaluate whether the risk is acceptable to us. If we do decide to go outside, we make decisions to control the risks (e.g. what to wear or what mode of transportation to use). All of this amounts to a form of systematic risk management decision-making. However, our risk management efforts are not always perfect, as we have all been caught out in the rain without an umbrella.

If risk management is not new, and if we, as individuals, do it all the time, why is there a sudden interest on the part of government departments and agencies? The answer lies in the fact that while we are all capable of good risk management, we do not always do it in a consistent manner; and while we are often good risk managers, we are often poor decision-makers. More than thirty years of behavioral decision research shows consistently, that in experiments and in real life situations, "humans are quite bad at making complex, unaided decisions"¹ A more structured approach to risk management decision-making helps in overcoming the problems with decision-making from which we all suffer. The use of a systematic process helps ensure more comprehensive analysis, and it also provides for continuous improvement over time. We get better at applying a systematic process the more we use it, something that does not occur with intuitive approaches.

More importantly, perhaps, is that decisions resulting from structured decision processes carry greater credibility than those arising from unstructured (including intuitive) processes. Decisions based on unstructured processes are often seen as arbitrary rather than analytical.

The basic goal in applying a risk management decision framework is to provide decision-makers with sufficient information about existing risks and about the trade-offs inherent in choosing options for dealing with these risks. When we evaluate alternatives, not only do we look at their effectiveness in reducing risks and their costs, but we also need to consider their impact on other defined objectives of the organization and of stakeholders. A systematic approach aids in these efforts.

The approach to risk management we are adopting within CCG provides an effective, credible, and internationally recognized framework for decision-making about the broadest range of risk decisions. It is a step-by-step approach that will help us do better at what we do.

2.2 FUNDAMENTALS OF DECISION-MAKING

Systematic risk management is really about applying a systematic approach to decision-making; its benefits result more in improved decision-making in general than in improved risk management in particular. When we strengthen our ability to make informed decisions, we strengthen our ability to make informed judgements about risk issues as well.

There are two fundamentals associated with all decisions, including risk management decisions:

- Decision-making revolves entirely around objectives. We decide to do things in pursuit of objectives and we decide to avoid things that might inhibit the attainment of objectives. Essentially, objectives form our decision criteria.

¹ P. Slovic, B. Fischhoff, and S. Lichtenstein (1977). "Behavioural Decision Theory." Annual Review of Psychology, 28, 1–39.

- All decisions, including a decision to do nothing, involve trade-offs. For example, we can inspect facilities more often and perhaps improve safety, but this requires more resources; we can save money by inspecting less, but this may impact on safety.

The risk management decision process is designed to provide decision-makers with sufficient information such that informed judgements can be made about the trade-offs associated to the decision situation under consideration, such as alternative resource configurations for SAR activities. The decision process is the same for all decisions, regardless of whether decisions are about the pursuit of opportunities or the avoidance of risk-related losses.

There are two key benefits associated with using a systematic approach to decision-making:

- A structured, step-by-step approach helps overcome the problems that all humans share when it comes to making decisions. It helps us avoid jumping to conclusions before sufficient analyses have been completed. It forces us to identify a broader range of options and it provides a framework for evaluating these options so that we do not favour a particular solution while overlooking other, potentially better, choices.
- A structured decision process increases the organization's credibility with other stakeholders, increasing as well the acceptability of decisions arising from the decision process. This leads to increased cooperation between government and stakeholders, and an increased likelihood of developing policies and programs that gain widespread public and industry support.

Given the principle that a structured decision process helps provide for more informed judgements, it follows that a structured communication/consultation process is an essential component of the decision framework. Informed judgements cannot be made without sufficient, relevant information upon which to base these judgements. The risk communication process provides the framework for acquiring the information necessary for making informed judgements. It also provides means for sharing this information between decision-makers and stakeholders.

3 METHODOLOGY OVERVIEW

In following the risk management methodology described in this Manual, some fundamental principles associated to SAR in general and SAR in the maritime environment in particular should be taken into consideration, especially when engaged in consultation and dialogue with stakeholders.

3.1 PRINCIPLES

Throughout the analysis of CCG SAR response delivery using this Manual, several overlying principles should be taken into consideration, particularly with respect to consultation and dialogue with stakeholders:

- There are limitations to what is reasonably achievable, in terms of SAR response alone: "The times and locations of distress situations are not predictable, and no amount of resources can guarantee that all people will be saved."² Indeed, response to SAR incidents once they occur represents, in reality, the final opportunity for mitigation of the risk to life posed by hazards existing in the maritime environment or resulting from the behavior and decision-making of individuals.
- "Individuals are primarily responsible for their safety and for not endangering others."³ An individual planning and preparing to operate on the water possesses the broadest range of opportunities and abilities to influence the outcome of maritime activities. Even once engaged in activities on the water, the individual retains the greatest span of control over the outcome through prudent behavior and decision-making to avoid becoming involved in a SAR incident (prevention) or by ensuring the ability to summon help in a timely fashion and survive long enough to assist rescuers in locating the incident and the for the provision of life-saving assistance (preparedness). Stakeholders must recognize and acknowledge their individual responsibility for their own safety and the fact that they alone possess the greatest ability to assure positive outcomes to their maritime activities.
- Response to maritime SAR incidents in Canada's waters under federal jurisdiction is not the sole purview of CCG; for incidents at the distress level (M1) or those with the potential to become distress incidents without intervention (M2), the operative principle will be to provide assistance to reduce or mitigate the risk to life as quickly as possible, regardless of the source of such assistance or specific capabilities. In the maritime environment, proximity to the incident location rather than a formal mandate to respond will most often dictate the source of such initial assistance. Indeed, under international maritime law and as enacted through the Canada Shipping Act all vessels, regardless of nationality or role, may be ordered by a duly constituted Coordinator of Marine Rescue to render assistance to a vessel in distress, to the extent that doing so would not place the tasked vessel and those aboard in jeopardy themselves.

² Government of Canada, Office of the Auditor General, *1992 Report of the Auditor General of Canada*, Chapter 8 – Search and Rescue, para 8.2, Internet: http://oag-bvg.gc.ca/internet/English/parl_oar_199212_08_e_8601.html; Accessed: 17 March 2013

³ Government of Canada, Office of the Auditor General, *1992 Report of the Auditor General of Canada*, Chapter 8 – Search and Rescue, para 8.11, Internet: http://oag-bvg.gc.ca/internet/English/parl_oar_199212_08_e_8601.html; Accessed: 17 March 2013

- Adding or enhancing response capabilities should not be considered the primary means of mitigating risks in the maritime environment. The number of uncontrolled and uncontrollable variables renders response among the least effective of risk mitigation means, not to mention that response also often imposes risk on the responders. Risk avoidance by individuals, through planning, preparation and prudent behavior and decision-making is by far the most effective and ultimately the least costly means of protecting lives and property during activities in the maritime environment.

Although not within the purview of CCG, nor the primary focus of analyses undertaken using the processes in this manual, measures to educate, encourage and, where appropriate, regulate and enforce sound planning, preparation, behavior and decision-making among those potentially at risk in Canada's maritime environment will nevertheless often be identified and recognized as means to reduce risk during such analyses. These measures should be taken into account and included when considering the recommendation of actions to mitigate risks.

3.2 SIX STEPS

The RAMSARD Manual outlines a six-step process that is aligned with the CSA's Q850-97 Risk Management: Guidelines for Decision-Makers. The six steps are: Initiation, Risk Identification, Risk Estimation, Risk Evaluation, Risk Control, and Action and Monitoring. The focus and objectives of each step are as follows:

I Initiation

The Initiation step is arguably the most important step, as it represents the **planning phase** of the analysis to be undertaken. This step includes defining objectives and the reason(s) for the analysis, as well as identifying related issues, the project team, resources, responsibilities and scheduling.

II Risk Identification

The Risk Identification step represents a major decision point for a routine application of the RAMSARD process as it **identifies the existing SAR response risks in the area under review and defines the scope** of any risk 'problem' to be dealt with (or establishes that the existing risks are being adequately mitigated). The existing risks are described in the form of risk scenarios, which are a defined sequence of events with an associated likelihood of occurrence and a range of potential impacts. Initial stakeholder consultation and analysis as well as a fairly detailed Preliminary Analysis will also be undertaken during this step. If the Preliminary Analysis determines that existing risks are assessed as being adequately mitigated and no new risks or management decisions need to be dealt with, the analysis can be ended at this point.

III Risk Estimation

The Risk Estimation step consists of **estimating the likelihood and consequences associated with Risk Scenarios** identified during the Risk Identification step.

IV Risk Evaluation

The Risk Evaluation step involves **evaluating whether the identified risks are acceptable or not** in terms of the benefits of the activities leading to the risks, and the needs, issues and concerns of stakeholders, including CCG. If the risks are considered acceptable at their current levels, the analysis can be ended at this point.

V Risk Control

The Risk Control step involves **identifying and evaluating measures to reduce the likelihood or the consequences of the risk scenarios previously identified**. The measures considered must include all available SAR response capabilities, not merely CCG resources. The effectiveness of each measure will be estimated and any remaining residual risk will be evaluated as to its acceptability; if risks are considered acceptable with the application of selected measures, the analysis may be ended.

VI Action and Monitoring

Action and Monitoring involves **implementing the risk control measures identified to reduce the risk(s) and then measuring the effectiveness** of these measures to confirm that the risk(s) have been reduced to an acceptable level. If not, the Risk Control step needs to be re-visited to identify and evaluate alternate or additional measures to reduce the level of residual risk to an acceptable level. If the measures are confirmed as having been effective, then no further action (except continued monitoring) is required and the analysis process is complete.



Note

The aeronautical and maritime SAR system differs from many risk analysis and decision-making situations for which the CSA Q850 was intended, in that, an ongoing but informal state of consultation with stakeholders and monitoring of system effectiveness exists. As a result, there will likely be no great revelations during an application of the RAMSARD process; however, in terms of detail and methodical analysis, the routine, 5-year application of RAMSARD will provide a more formal and comprehensive review of SAR Area risks and the effectiveness of SAR response in mitigating them.

4 DETAILED METHODOLOGY

4.1 GENERAL

Each of the six steps introduced in the previous chapter will be explained, followed by a form to guide completion of the step and a simple checklist to track that all aspects have been completed. These are working forms and are not intended to be included in the Analysis report.

4.1.1 Initiation

This step consists of defining and structuring the organization's objectives; defining the opportunity or problem triggering the risk management decisions; identifying associated risk issues; setting up the risk management team; and beginning the identification of affected stakeholders.

The Initiation step is an important element in the decision process. It is the planning phase, and the necessary time should be taken to get it right.

In this step of the process the following needs to be accomplished:

- Define the fundamental objectives of the Analysis;
- Define any specific issues pertaining to the Analysis or the area(s) under review;
- Identify the Analysis Team(s);
- Assign responsibilities and confirm resources for the Analysis;
- Identify stakeholders to be consulted (by activity/organization/category);and
- Develop a plan and schedule for the Analysis, including stakeholder consultations

Launch of each year's activities towards the five-year routine application of RAMSARD Analysis will be done via a Director General, Operations' letter to Assistant Commissioners in the Regions. This letter will direct the Assistant Commissioners to identify an appropriate number of SAR Areas to be reviewed (in order to complete all areas within the 5-year cycle) and will schedule a three-day meeting at CCG Headquarters to discuss and plan the activities. It may also specify certain Areas to be reviewed in that year's Analysis.

In considering Areas to propose for review, Regions should take into account the impact of shared CCG response resources between adjacent Areas and the logic in reviewing those Areas concurrently. Regions also may be aware of emerging situations or issues in respect to SAR response in certain Areas which might prioritize their review ahead of others. This information, along with a general sense of the Areas being proposed for review, will be topics for discussion at the Initiation meeting in Ottawa. There are three key considerations for this step:

Define the objectives of the Analysis.

The most important first step when making any decision is to define the fundamental objectives in the context of the decision situation. In other words, define what matters with regards to the program and to the decisions to be made at the end of the process. This may be in the context of the program's objectives and/or it may also address larger strategic CCG objectives. These fundamental objectives provide the criteria for the decisions that will be taken during and at the completion of the Analysis.

In the case of a routine, 5-year cyclic application of the RAMSARD process, the objective is quite simple: Confirm that SAR response delivery in the area under study is adequate (i.e. meeting the CCG Performance Standard in terms of lives saved versus lives at risk), that CCG resources are being used effectively and efficiently, and that there are no known or emerging risks that require further analysis and consideration of resource adjustment. CCG Management may direct a RAMSARD application to an area or areas for other reasons, such as in response to political concerns regarding SAR response or consideration of resource allocation changes. In these cases, the objective(s) of the Analysis will be specified in the initiating direction from Management.

Define the problem or opportunity.

The next consideration is to define precisely the issue or opportunity leading to the Analysis. What is the trigger for the decision(s) that will be taken? Defining the problem sets the scope for Analysis and helps keep it focused. Note however that as the Analysis proceeds, there may be a need to redefine the scope as new information becomes available.

Identify the associated issues.

For planning purposes, it is also important to identify the full range of concurrent issues likely held by stakeholders (the program included), as this will also affect the scope of the Analysis. What are the impacts of the issue or opportunity, and of the decisions being considered? How important are they to stakeholders?

It will be important to identify who will be involved throughout the Analysis, and at what point in the Analysis they are required to be available. For instance, internal and external stakeholders will be involved in consultation(s), and CCG management positions will be involved in review of progress. Once it is identified who is needed and when they are needed, task assignment can begin and a timeline can be developed for the Analysis.

What decisions need to be made, when they need to be made and who will be making them, must also be identified at this stage. Sometimes the decisions will be made by the Analysis Team; sometimes, the decisions will be made by others. Decision-makers may require prior notice before they provide a decision and this may need to be scheduled ahead of time (e.g. CCG Management Board).

Note: Although the Analysis Team will comprise SAR experienced personnel, there will also most likely be a need to involve others at some stage. For example, contributors might be needed to provide information for the Analyses, to provide legal advice or other expert opinions, to make decisions, or to supply other resources. The better these external contributors can be identified and provided advanced notice of the requirements and dates, the more likely they will be available with the input required so as not to delay the completion of the Analysis.

Finally, it must be determined who the stakeholders for this decision situation might be. Who will be affected by the decisions being made and who might have an impact on what these decisions are? These stakeholders will need to be consulted and communicated with throughout the process, and a plan should be developed to carry out these consultations. Fundamentally, communications through consultations support the Risk Analysis/Risk Management decision process, and as such this aspect needs to be coordinated.

In this regard, the first step is to identify the communication and consultation objectives. During a RAMSARD Analysis of SAR response in an area, two-way communication will be essential and should be planned to occur throughout the process to support decision-making. Information should be provided to stakeholders and information, concurrence or at least confirmation of understanding should be elicited from stakeholders.

The purpose of the decision process is to provide decision-makers with sufficient information so that they can make informed judgments about the trade-offs inherent in choosing amongst alternative courses of action. The communication process provides the means for the flow of information between decision-makers and other stakeholders.

The key decisions that need to be made at this Initiation step relate to the following questions:

- Have the fundamental objectives relevant to the decisions to be made been identified?
- Have any problems or opportunities been accurately and completely identified?
- Has the range of issues with which the Analysis will have to deal been identified?
- Have all of the stakeholders to be consulted been identified (at least by organization)?
- Has the (core) Analysis Team been identified and resources for the Analysis confirmed?
- Has a schedule and plan for the Analysis, including consultations, been developed?

The following pages contain a Guide for Initiation Actions to be undertaken, a basic list of data and information to be gathered to support the Analysis, and a simple checklist to record completion of each of these tasks.

Table 1 - Initiation Actions

Fundamental objectives of the Analysis	Routine (5-year) analysis confirms that:
	<ul style="list-style-type: none"> • SAR response delivery in the area under review is adequate (meeting CCG's 90% Performance Standard in terms of lives saved versus lives at risk); • CCG resources are being used effectively and efficiently; • There are no known or emerging risks that require further analysis.
	<ul style="list-style-type: none"> • Special (Directed) analysis: The above, plus:

<p>The problem or opportunity to be addressed</p>	<p>Routine (5-year) analysis: None.</p>
	<p>Special (Directed) analysis:</p>
<p>Specific issues pertaining to the Analysis</p>	
<p>Identify the Analysis Team (Positions indicated at right are notional only)</p>	<p>Team Leader: Analyst 1: Analyst 2: Analyst 3: Analyst 4: Consultant 1: Consultant 2: Consultant 3: Legal Advisor: Financial Advisor: Communications Advisor: Others:</p>

<p>Assign responsibilities</p>	<p>Examples:</p> <ul style="list-style-type: none"> • data gathering (takes time: assign everyone); • environmental scan preparation (use 2007 Needs Analysis as basis and update); • stakeholder consultation coordination (names and contact information to set consultations); • data presentation and graphics preparation (slides for consultation briefings, tables and graphs for report); • report writing and preparation; and • travel/meeting logistics.
<p>Identify stakeholders</p>	<p>(Situation/Area Specific)</p> <p>Examples:</p> <ul style="list-style-type: none"> • Regional Superintendent, Maritime SAR; • JRCC RSMS; • RCAF Primary/Secondary SAR Units serving area; • Fisheries Conservation & Protection Area staff; • RCMP (Federal/Provincial) policing; • Other police forces with on-water presence; • CCGA; • Civil Air Search and Rescue Association; • RCN; • Fish, Food and Allied Workers or other union group; • Port Authorities; • Ferry/Cruise/Commercial cargo companies; • Canadian Power Squadrons; • Sailing Associations; • Kayaking and/or Canoeing Groups; • Marinas; and • Etc.

Develop a plan and schedule for the Analysis	Work backwards from due dates set at Launch. Allow time for travel/weather interference and additional follow-up consultation(s) if needed.
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Table 2 - Data Requirements

These are suggested reports/data to be gathered and analyzed. It is not necessarily a complete or limiting list, but teams should avoid collecting too much with data as it must be analyzed to provide useful information and shape conclusions. For very busy Areas with many incidents, this data analysis will consume much staff time and effort and plans should be made accordingly.

SOURCE	INFORMATION
Statistical information SAR (SISAR)	<ul style="list-style-type: none"> • Incident summaries for all incidents for 5 years. • Numbers/classification of incidents. • Location of incidents (lat/long). • Persons on board/lives lost/missing. • Response numbers to incidents by resource type. • Resource reaction time for each class of incident and resource type (CCG, RCAF, CCGA, etc.). • Resource time to arrive on-scene. • Incidents per search object activity (pleasure craft, fishing, marine transportation, etc.).
JRCC	SAR Operations Reports - for significant incidents.
Transportation Safety Board (TSB)	Accident Investigation Reports.
SAR Mission Management System (SMMS)	As incident data is assessed and analyzed it may be necessary to access specific case files from SMMS in order to extract more detailed information.
Information System on Marine Navigation (INNAV)	Commercial shipping movements statistics.
Environment Canada	Climatological information as applicable to the Area under review, including ice coverage.
Port Authorities	Cruise ship visit statistics (visits/passengers).
Ferry Operators	Ferry movement statistics (passengers carried).
NAV Canada	Commercial air transits/landings in area and average passenger loads.

Natural Resources Canada	Offshore oil exploration/wells information.
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Note: Some of this data and information will be used to analyze the SAR response activity in the area, whereas other information will be used to provide context for the Analysis via the updated Environmental Scan.

Table 3 - Initiation Checklist

Fundamental Objectives Defined?	YES - NO - N/A
Problems or Opportunities Identified?	YES - NO - N/A
Issues Pertaining to the Analysis?	YES - NO - N/A
Analysis Team Identified/Resources Confirmed?	YES - NO
Responsibilities Assigned?	YES - NO
Stakeholders Identified?	YES - NO
Plan and Schedule for Analysis Developed?	YES - NO

4.1.2 Risk Identification

The purpose of the risk identification step is to define the scope of the decisions, identify exposures to loss (risks), describe these risks as risk scenarios - a defined sequence of events with an associated frequency (likelihood) and range of consequences (impact) - and conduct a Preliminary Analysis.

The purpose of undertaking a Preliminary Analysis is to define the basic dimensions of the risk problem and to undertake an identification, analysis and evaluation of potential risks. This is done using readily available information and data (e.g. SISAR incident data/SAR Operations Reports and TSB Reports), as well as confirmed and/or supplemented by information received during an initial stakeholder consultation.

This Preliminary Analysis will help determine:

- Whether a situation exists that requires immediate action;
- Whether the matter requires further study prior to any action being taken; or
- Whether the Analysis should be ended as the risk problem is determined not to be an issue.

Note: A Preliminary Analysis may be all that is necessary for decision-makers to make an informed judgement about the issue(s).

4.1.2.1 Scope

The scope of the Analysis needs to be defined to avoid confusion when considering what to include in the Analysis and what to exclude.

The scope of the Analysis will be defined by the breadth of issues that are to be addressed. This will include program and CCG issues, but it may be prudent to limit the scope with respect to other stakeholder issues. For example, public or industry stakeholders may raise issues that are outside the mandate of the program, such as fisheries or vessel safety regulatory issues. In cases where a decision is taken to exclude consideration of some stakeholder issues, you will need to communicate reasons for doing so.

It is important to define the scope of the Analysis at the start so that efforts remain focused. However, the scope could be expanded at a later date if things change.

The definition of the scope will comprise:

- A description of the activity presenting the issue or opportunity (e.g. considering the re-locating or replacement of a SAR response resource serving the area under review);
- The possible risks associated with the activity (e.g. the re-located or replacement SAR response resource may not contribute to the same degree in meeting the Performance Standard);
- The decisions that will need to be made (e.g. should the proposed SAR response resource change be enacted?);
- The criteria for making any decisions (e.g. can other SAR response resources serving the area compensate for the relocated or replacement resource so that the Performance Standard is still met?);
- The decision-makers (e.g. CCG management);
- Stakeholders (e.g. client groups in the area, SAR response partners, etc.); and
- Any assumptions or constraints affecting the decisions (e.g. assumption that partners' SAR response resources will remain unchanged).

4.1.2.2 **Environmental Scan**

An Environmental Scan will be prepared in order to describe the area in terms of its dimensions, its climatology (i.e. prevailing winds and speeds, average wave heights, temperatures, and the presence of sea ice and/or icebergs), its maritime geography (i.e. coastline, inlets, rocks, shoals, etc.), and its demographics related to the maritime environment (i.e. coastal population centres, deep water ports, maritime activity statistics, etc.). As a starting point, the information from the 2007 SAR Needs Analysis should be used and updated with more current climate information available from Environment Canada and maritime activity data from various sources as appropriate:

- Participating vessels and Long Range Identification and Tracking (LRIT) data from CCG's Marine Communication and Traffic Services;
- Fishing seasons, zones, fishing effort data from Fisheries and Oceans Canada;
- Ferry data from ferry companies or Ferry Operators Association; and
- Whale watching, kayaking, deep sea fishing, etc. data from local associations or Departments of Tourism.

Note: Pleasure craft data has been elusive in the past. Methodologies have been developed, and data captured on both the East and West Coasts. These methodologies and data should be the starting point as they may be sufficiently current and representative for the purposes of the RAMSARD.

The Environmental Scan will be presented during the initial Stakeholder Consultations, seeking stakeholder input for its update and improvement or concurrence with the completeness and accuracy of the information. As an Annex to the RAMSARD Analysis Report, the revised Environmental Scan will constitute a key part of the Report to management, providing context on the area under review and its characteristics.

4.1.2.3 **Risk Scenarios**

In the risk management decision process, risks are described as risk scenarios, which constitute a defined sequence of events with an associated likelihood and range of impacts. The description will identify a hazard (source of potential harm), the likelihood of a loss occurring, and the potential impact (magnitude of the loss) should it occur.

A simple risk scenario would be described as follows:

An ice storm produces an icy sidewalk (another hazard). The risk is that someone might slip and fall on the icy sidewalk and injure themselves.

The risk scenario would be described as someone slipping on an icy sidewalk and injuring himself."

The risk scenario contains a chance (likelihood) of slipping and a range of consequences if there is a fall (from bruised ego to broken bones). Note that without the hazard (the icy sidewalk) or without exposure to the hazard (someone walking on the icy sidewalk), there is no (zero) risk of "someone slipping on an icy sidewalk and injuring themselves".

Another example of a risk scenario might be that a high attrition rate produces requirements for increased overtime. The high attrition rate (hazard) produces an increased requirement for overtime (another hazard). There are a variety of consequences associated with these hazards, ranging from an inability to fully staff 24/7 Centres to a decrease in quality of life of personnel due to high requirements for overtime. For example, one risk might be an increase in staff requiring sick/stress leave due to decreased quality of life and high stress levels caused by increased workload.

Within the maritime SAR context, a risk scenario might involve a fishing vessel caught in a storm, catching fire, colliding with another vessel or running up on rocks or a shoal). These hazards may individually result in the occupants of the vessel being in the water, and the risks would include drowning, hypothermia or trauma from being washed against a rock or the shoreline.

SAR incident summaries describe such risk scenarios, since they include hazard(s) (e.g. storm with high seas), exposure to the hazard (e.g. fishing vessel caught in a storm) and consequences (e.g. capsized fishing vessel, with occupants in the water or in a life raft and at risk of serious injury or death from hypothermia or drowning). The number of occurrences of each type of risk scenario per year provides a reasonably good estimate of the frequency or likelihood of the occurrence. The range of consequences with which a RAMSARD Analysis is concerned is limited to lives at risk or with definite potential to be at risk if no action is taken.

For a RAMSARD Analysis, the sources of information to be used in risk identification will normally be limited to:

- Accident databases (SISAR, SAR Operations Reports, TSB Reports);
- Experience and personal observations garnered from stakeholder consultations; and
- Professional judgement on the part of the Analysis Team

The types of hazards to be considered will include:

- Natural (e.g. weather, sea state, ice conditions, shoals, rocks and shallows, etc.);
- Technical (e.g. vessel size, type, equipment, condition, activity, etc.); and
- Human (e.g. activities, knowledge, skills, behaviour, attitude, decision-making, etc.).

The consequences to be considered are solely limited to health losses (e.g. serious injury or death). Although CCG endeavours to take reasonable measures to protect property, it is not the focus of SAR response resource or service provision. Indeed, consideration of the direct cause of lives being at risk or being potentially at risk in the maritime environment is not relevant to an analysis of SAR response risk. These considerations are important in assessing the effectiveness of prevention programs or targeting education, regulation and enforcement activities, but the reason why an individual is placed at risk in the water is irrelevant to the need for SAR response.

4.1.2.4 Area Maritime SAR Risk Profile

Using primarily the historical SAR incident data from SISAR, a profile of maritime SAR risk can be created for the area under review. This profile should be developed **relying not only on the data itself, but on the experience and knowledge of the Analysis Team**. It should be depicted in graphical forms, supported by narrative descriptions, interpretation and analysis, in order to describe the recurring maritime SAR risks in the area and the impact and effectiveness of maritime SAR response delivery in mitigation of those risks.

Incidents classified based on type and level of severity
<p>M - Maritime Incidents (M1, M2, M3, M4)</p> <p>A – Aeronautical Incidents (A1, A2, A3, A4)</p> <p>H – Humanitarian Incidents (H1, H2, H3, H4)</p> <p>U – Unknown Incidents (U4)</p> <p>1 - Distress incidents: A vessel or a person is threatened by grave and imminent danger and requires immediate assistance. (Life-threatening situation was judged to be present or close at hand at some point during the incident);</p> <p>2 - Potential Distress incidents: The potential exists for a distress incident if timely action is not taken; i.e., immediate responses are required to stabilize a situation in order to prevent distress;</p> <p>3 - Incidents resolved in the uncertainty phase (Non-Distress): No distress or perceived appreciable risk to life apparent. (General calls for assistance);</p> <p>4 - False alarms and hoaxes: Situations that cause the SAR system to react which proves to be unjustified or fabricated, such as a mistaken report of a flare.</p>

The profile should focus primarily on maritime distress and potential distress (M1 and M2) cases. (M3 and M4) cases will be considered in the overall statistics, but will be distinguished from M1, M2 cases in the depiction of all maritime SAR cases in the area.

While the area risk profile developed from the SISAR incident database will likely include most of the commonly occurring maritime SAR incident scenarios, some of these scenarios might lack representation in the five-year span of the data, owing in part to differing levels of maritime activities and differences in the environmental characteristics in the area under review. Likewise, somewhat rare or very rare scenarios, such as major incidents, will probably also be absent in the data; however, these would mostly be absent from national incident data owing to their rarity.

In these cases, an assessment needs to be made as to whether there exists any discernible likelihood that the scenario could occur in the area. If so, the frequency, range of possible consequences and whether the existing SAR response capabilities are adequate to deal with the risk would need to be assessed. For the very rare, major SAR incident scenarios, the potential for occurrence and the consequences will be assessed. In the case of major SAR incident response, the role of area primary SAR resources would be to establish initial on-scene coordination and communication pending arrival of resources (e.g. vessels) with greater endurance and more capability to discharge these functions as part of a whole-of-government response.

As with the Environmental Scan, the basics of the risk profile of the area will be presented to stakeholders during consultations, seeking their concurrence and any additional information or input they may wish to offer. It may be useful to prepare this presentation in Power Point format to facilitate its sharing and discussion with stakeholder groups. As with the Environmental Scan, the risk profile information will also be included as an Annex to the RAMSARD Analysis Report to management. We suggest the following information be included, but other information can also be added:

- Map depicting the SAR Area under review;
- Series of (5) maps showing maritime SAR incident locations by year for the 5-year period under review and distinguishing class of M1, M2 incidents versus others;
- Bar graph showing 5-year average monthly M1, M2 incident distribution;
- Bar graph showing seasonal distribution of M1, M2 incidents by year;
- Bar graph showing 5-year seasonal distribution of M1, M2 incidents;
- Bar graph showing average response time (tasked to on-scene) for all cases by year and by category of resource (primary, secondary, other [includes CCGA], civilian);
- Bar graph showing average response times (tasked to on-scene) for M1, M2 incidents by year and by category of resource (as above);
- Map showing area boundaries and radius of action for CCG primary SAR resources serving the area with statement describing radius (in NM) and any seasonal limitations as applicable; and
- Map showing area boundaries and radius of action (from home port) for CCGA SAR resources serving the area, with statement describing radius (in NM) for various types of CCGA resources and seasonal limitations as applicable.

Additional graphics may be prepared to depict the following information:

- Breakdown of incidents by activity of the vessel involved (pleasure boating, fishing, commercial, marine transportation); and
- Annual historical M1, M2 incident statistics for previous five years: incident numbers, lives saved, lives lost, lives at risk, 5-year totals, average lives at risk and average lives lost per year.

The presentation of this information to stakeholders will be used to stimulate discussion during the consultations, seek their input as to the nature of SAR response risks in the area and assist in the Stakeholder Analysis. It is important to recognize the consultations as an opportunity to shape stakeholder understanding of their own roles and responsibilities with respect to undertaking activities in the maritime environment and how and where CCG maritime SAR response capabilities fit in the scheme of maritime SAR risk mitigation.

4.1.2.5 Stakeholder Analysis

A Stakeholder Analysis is an integral part of the risk communication process, and it is one of the most useful tools incorporated within the Q850 risk management decision framework. The Stakeholder Analysis provides the decision-maker with a documented profile of stakeholders which helps to develop more effective communications and consultations.

A Stakeholder Analysis is essentially a survey of stakeholders to identify:

- Who they are;
- Whether or not they are at risk, and whether or not they understand their exposure;

- Their level of interest regarding the issues under consideration;
- Their objectives, needs, issues, and concerns (what matters to them);
- Their knowledge regarding issues under consideration (and any knowledge gaps);
- Any misperceptions they might have;
- Who they trust to provide them with information;
- The types of communication processes that they might favour; and
- Other information relevant to the decisions at hand.⁴

It should be noted that as a stakeholder, the decision-maker should also be subject to this Stakeholder Analysis. This means that information related to the needs, issues, concerns, and knowledge gaps of the decision-maker's organization should also be documented.

Conducting a Stakeholder Analysis with stakeholders present helps build trust in the process and goes a long way to providing improved insight for all participants. Improved insight into risk issues, on the part of all stakeholders, is an ultimate objective of the risk communication process.

When dealing with risk issues, where concern is high and trust is low, effective communications and consultations among stakeholders are essential for building support for government policies and actions. The Stakeholder Analysis also provides an excellent tool for ensuring that communications and consultations are focused and effective.

Along with presenting the Environmental Scan and Area Risk Profile to stakeholders, the Analysis Team should document stakeholder comments and input for adjustment of this information as well as further analysis of stakeholder perceptions and concerns. Notes taken of stakeholder comments will be included as an Annex to the RAMSARD Analysis Report to management.

4.1.2.6 Preliminary Analysis

Not all risks will necessitate an elaborate, detailed analysis. For some risks, informed judgments can be made with only a simple but detailed analysis of readily available information. If a risk is comparable to one that has already been dealt with successfully, a similar solution can be readily considered. This is often the case when examining the risks dealt with by maritime SAR response services, since in a given year, most maritime SAR risk scenarios will be represented within the incident statistics of the SAR system. Those statistics will include an indication of likelihood of occurrence as well as consequences (i.e. how many lives at risk or potentially at risk).

The purpose of the Preliminary Analysis is to define the basic dimensions of the risk and to undertake an identification, analysis, and evaluation of potential risks. **This is basically a high-level risk management process with limited analysis and consultations, and using mostly readily-available information.**

A Preliminary Analysis results in a determination that either:

- An emergency or other situation exists, and corrective action should be taken immediately (given the ongoing communication, consultation and self-evaluation in the maritime SAR system, it is unlikely that a situation requiring immediate action would not have come to light prior to a RAMSARD Analysis); or
- There is a need to undertake a more detailed analysis (e.g., where management wishes to consider adjustments to SAR response resource allocation in the area, or existing CCG and other SAR response resources serving the area are proving incapable of collectively meeting CCG Performance Standards); or

⁴ Canadian Standards Association Q850-97 Publication

- The Analysis should be ended here if the risk is determined not to be a risk problem.

In the case of a routine, 5-year RAMSARD Analysis, it will be considered that there is no risk 'problem' to be addressed when it is determined that SAR response services in the area under review:

- Are meeting the CCG Performance Standard for existing risks, based on historical incident analysis;
- Are being efficiently employed; and,
- Are assessed as being capable of mitigating known or expected future risks, including rare event risks such as major SAR incidents, within the expected parameters (i.e. on-scene coordination only).

Under RAMSARD, analysts should first perform a Preliminary Analysis to determine whether a more detailed analysis is required. It should be noted that a Preliminary Analysis is useful on many levels: the information it captures can form the basis for more detailed study, if such is required.

Here are some considerations when deciding whether to conduct only a Preliminary Analysis or a more detailed analysis:

- A Preliminary Analysis may be the only practical alternative if decisions are required immediately;
- A more detailed analysis may be required if there are legal considerations associated with a particular decision situation (e.g., a change to federal government commitments in support of an area or activity);
- More analysis may be prudent if there is substantial media or public interest in the situation (e.g., maritime incident fatalities have increased in the area in relation to a new or riskier activity); and
- More analysis may be prudent if the potential consequences of the decisions are significant (e.g., a decision to remove a SAR response resource without replacement).

The goal of the analysis process is to provide sufficient information so that decisions can be made with confidence. For the sake of efficiency, decision-makers should consider carefully how much analysis is sufficient for the decisions at hand. A detailed Preliminary Analysis will often suffice.

The Preliminary Analysis can identify those known maritime SAR risks that are being satisfactorily mitigated by the SAR system as a whole and assess the effectiveness of the CCG contribution to that mitigation. At that point, those risks mitigated need not be further considered in the process unless the stakeholder consultation reveals information pertaining to those risks that is not included in the SISAR data and that may impact existing mitigation measures or require the consideration of new ones.

The steps of a detailed Preliminary Analysis are listed below. Of note, these steps will also constitute the section headings in the RAMSARD Report to management prepared following an Analysis.

4.1.2.7 **Preliminary Analysis: Incident Data Review and Analysis**

This step uses the five-year historical SAR incident data from SISAR to ascertain what risks existed in the area under review. Risk scenarios considered in this step are those that involved consequences of serious injury or loss of life and those which had the potential to develop into scenarios with such consequences (M1, M2). Aspects to be analyzed and considered include:

- Yearly rates of M1, M2 incidents;
- Seasonal distribution of incidents (and causes);
- Monthly distribution of incidents by year and averaged for the five years of data;
- Incident types (.e.g. fire, capsizing, etc.) by category and distance from shore (inshore, offshore, remote);
- Incident type breakdown by proportion of each type; and
- Incident distance from shore for all incidents and for M1, M2 incidents only

Graphics such as bar and pie charts should be used as appropriate and accompanied by narrative description and analysis. Incident types not represented in the data should be noted in the narrative as to potential likelihood of occurrence in the area, with an assessment of the existing SAR response resources to deal with them.

4.1.2.8 **Preliminary Analysis: Meeting the CCG Performance Standard**

The data should be used to assess whether the CCG Performance Standard of 90% of lives at risk saved is being met on a yearly basis and on an average over the five-year review period. If it is not met, reasons why should be explored. SISAR SAR incident summaries for cases with fatalities should be analyzed to determine whether or not lives were lost before the SAR system was alerted or, as best can be determined, with no reasonable opportunity for intervention by SAR responders.

When assessing SAR performance, it has long been CCG policy to include in the statistics all lives lost in maritime SAR incidents, regardless of when they were lost or whether or not there was any reasonable opportunity for SAR responders to save those lives. The argument in favor of this approach is that such inclusion better measures SAR system performance, which includes activities unrelated to SAR response such as prevention. In contrast, in making assessments of the effectiveness of SAR response services alone, the International Maritime Organization (IMO) does not include lives lost before system notification or where it can be determined that no reasonable opportunity existed for successful intervention by SAR responders. Indeed, IMO points to studies that suggest that up to one third of fatalities in maritime SAR incidents occur very shortly after system notification, leaving no reasonable probability of successful intervention by SAR responders.

Therefore, in consideration of the limitation of RAMSARD Analysis application to SAR response delivery versus SAR system assessment, it is reasonable to apply the IMO approach when assessing lives lost and CCG's results with regards to its Performance Standard. The Analysis of SAR incident summaries, together with SMMS case files, SAR Operations Reports and TSB Accident Reports as necessary, should be documented to substantiate numbers of fatalities adjusted for this purpose.

4.1.2.9 **Preliminary Analysis: Resource Response Times in Incident Resolution**

Response time is defined as the time from which the 'SAR system alert' is received, until, a SAR resource arrives on scene at an incident location or search point. Because of the size of Canada's maritime SAR Regions and the variability in environmental conditions, particularly sea conditions, visibility and the potential presence of sea ice or icebergs, CCG does not use response times as a measure of SAR response performance. Nevertheless, a broad consideration of collective average response times for all resource types and categories in a SAR Area is useful in understanding the availability of SAR response resources and their ability to cover the area in reasonable time. It is further useful for the information of stakeholders, particularly client groups, to emphasize the need to prepare and equip to survive in the water long enough to permit a reasonable chance of successful rescue.

Yearly SAR system average response times for the area should be computed from the SISAR data and depicted in bar graph format for all categories of incidents and separately for M1 and M2 incidents. Analysts should assess significant variations among the years and/or trends and seek to identify possible explanations, particularly where trends are negatively oriented (e.g. longer response times). A narrative should accompany the depictions and explain variations.

4.1.2.10 **Preliminary Analysis: CCG Primary SAR Vessels and SAR Incident Response**

The specific involvement of CCG primary SAR vessels assigned to or serving the area under study should be assessed for M1, M2, and M3 category incidents. M3 incidents should be included since CCG and CCGA resources are often tasked to respond to these incidents, which, while not constituting a distress or potential distress situation, may ultimately degrade into these categories without timely assistance being provided.

SISAR data and incident summaries as well as SMMS case logs should be consulted to determine the number of cases in each category for which CCG primary SAR vessels were the means of rescue. In this regard, it is important to distinguish between the tasking of CCG vessels and their role as the resource carrying out the rescue. For M1 cases, a large number of resources of varying types are tasked to respond, since timeliness is more important than economy, effort or resource category. Therefore, CCG primary SAR vessels are often not the means of rescue in these cases. In M2 cases, since the JRCCs lack the authority to compel nearby vessels to respond, they most often task CCG, CCGA and/or other federal government vessels, which will therefore be more likely to be the means of rescue. This likelihood is increased where response to M3 cases are concerned.

Often the result of mechanical breakdown, M3 incidents are normally reacted to by the SAR system through the issuance of a Marine Assistance Radio Broadcast, seeking assistance from any willing nearby and capable vessel. For non-distress cases, nearby vessels cannot be directed to assist. Following the issuance of the Marine Assistance Radio Broadcast and under reasonably fair weather and sea conditions, the situation is simply monitored, awaiting notification from the affected vessel or an assisting vessel that the situation is being or has been resolved. Impending nightfall or worsening weather and sea conditions, if the M3 case is not yet resolved, CCG or CCGA vessels will often be dispatched to provide the necessary assistance (such as a tow to a safe anchorage or harbour). This prevents degradation of the situation to a distress or potential distress category and reduces risk to responders by resolving the incident under safer and more favourable conditions. Thus the role of CCG primary SAR vessels in M3 category incident resolution should be considered in the context of a reduction or avoidance of M1 and M2 cases with associated reduction in lives at risk.

A graphical depiction should be prepared, showing the proportion of M1, M2 and M3 incidents responded to by CCG primary SAR vessels in or serving the area under review, accompanied by a narrative describing the contribution in percentage by each CCG primary SAR vessel.

4.1.2.11 **Preliminary Analysis: Major SAR Incident Risk**

The area should be assessed as to the potential for occurrence of a major SAR incident (such as one involving a vessel or large aircraft over water) and the adequacy of response capabilities in the area to deal with such occurrence. Response to major SAR incidents is the focus of specific, major SAR incident plans developed and maintained within each SAR Region. The scale of consequences in terms of numbers of lives at risk during a major SAR incident dictates that response to such incidents will almost always involve a whole-of-government approach. Given the range of circumstances and the rarity of occurrence of major SAR incidents, no jurisdiction or specific agency can be expected to maintain adequate resources to unilaterally deal with such response.

Owing to their alert posture, CCG primary SAR vessels in proximity to a major SAR incident as well as RCAF primary SAR aircraft serving the affected area will be tasked for initial response while all other possible capabilities are identified and brought to bear. The priority for this initial response will be the provision of on-scene communication and coordination of response activities by follow-on resources. Therefore, in assessing the adequacy of the area's capacity to respond to a major SAR incident, the sole capability required is that of initial on-scene communication and coordination, pending the arrival of more capable CCG or other vessels.

4.1.2.12 **Preliminary Analysis: Summary of Incident Data Review and Analysis**

At this point, the results of the review and analysis of incident data are summarized into conclusions, based on the characteristics of the hazards, risks and incidents in the area: types of incidents, proximity to shore, activity of vessels involved in incidents, lives lost versus lives at risk rate. A conclusion should also be stated regarding the adequacy of capabilities serving the area to deal with major SAR incident risks. Most importantly, a conclusion as to whether or not the CCG minimum Performance Standard has been met, both on average over the study years and by individual years, with the following caveat: where the response capabilities had a reasonable opportunity to intervene.

4.1.2.13 **Preliminary Analysis: Stakeholder Consultations**

This step consists of summarizing the main points raised during stakeholder consultation sessions, while the complete notes taken during the consultations should be included as an Annex to the Preliminary Analysis Report. Any issues or areas of heightened concern on the part of stakeholders should be highlighted for additional investigation and analysis. Often, stakeholders' concerns will reflect perceived heightened levels of risk rather than entirely new risks. The results of investigation and analysis of these concerns should be shared with stakeholders in follow-on consultations, along with proposed action to mitigate any heightened risks.

4.1.2.14 **Preliminary Analysis: Analysis of Stakeholder Input and Concerns**

Stakeholder input and concerns should be analyzed and compared to the assembled historical incident statistics. Explanation of any significant discrepancies should be sought and would be a topic for follow-on consultation with stakeholders, either to seek further details or to respond to the original concerns raised. At times, stakeholders might share concerns that have little to no direct bearing on SAR response provision, but are reflective of issues that may lead to increased demand for SAR response if unresolved. For example, in certain circumstances, rigid fishery opening dates, irrespective of prevailing weather and sea conditions, may be perceived as incentives for risky behaviour by individuals in a competitive fishery.

In cases such as these, the details should be noted for later consideration as to whether any SAR response risk mitigation or recommendation to the appropriate party for action is required. Critical to such consideration is the recognition and acceptance of the responsibility associated with the risks, as SAR response (risk mitigation) is much less effective than risk avoidance.

4.1.2.15 **Preliminary Analysis: Conclusions**

This step in the detailed Preliminary Analysis speaks to the following three possible determinations.

- The first possible determination, that a situation exists that requires immediate action, is highly unlikely, owing to the ongoing communication, consultation and self-evaluation inherent to the SAR system.
- The second possibility is a determination that a more detailed analysis is required because management has directed consideration of alternate response resource configurations in the area or the existing SAR response resources are proving recurrently inadequate to meet the CCG minimum Performance Standard. In this case, the risk scenarios developed, along with their historical likelihood of occurrence and range of consequences to life as determined from SISAR data, will form the basis for such further analysis, following the process outlined in the succeeding RAMSARD Sections under Risk Estimation, Risk Evaluation, Risk Control and Action and Monitoring.
- The third possible determination, which is very likely, is that no risk problem exists in the area under review. This means that SAR response services in the area under review are meeting the CCG Performance Standard for existing risks based on historical incident analysis; are being efficiently employed; and are assessed as being capable of mitigating known or expected future risks, including rare event risks such as major SAR incidents, within the expected parameters (i.e. on-scene coordination only).

With the third type of determination, the Analysis should be ended and a Report to this effect prepared for management review and acceptance. A summary of conclusions should be prepared under the following headings:

- **Effectiveness:** A section on the achievement of the CCG minimum Performance Standard and the degree of involvement by CCG primary SAR vessels assigned to or serving the area, in terms of numbers of responses for M1 and M2 incidents as well as their role in resolving M3 incidents;
- **Efficiency:** A section on cost-benefit financial terms, the value of the contribution by CCG primary SAR vessels to the saving of lives at risk and lives potentially at risk in the area using Treasury Board's value of a statistical life figure of \$6M and attributing full-value for lives saved in M1 incidents and a recommended attribution of only 10% value for lives saved in response to M2 incidents. No value should be attributed to lives (persons on board vessels) in M3 incidents to which CCG primary SAR resources responded.

The total value of lives saved should be compared to the estimated costs of the provision of the CCG primary SAR vessel (personnel, operations and maintenance for vessel, infrastructure and fuel) to assess a measure of the efficiency of CCG primary SAR vessel use in the area.

New Risks/Residual Risks: A section describing any new or heightened risks identified, whether or not these are risks best mitigated at the SAR response level and whether or not the existing SAR response resources serving the area are capable of mitigating these risks to an acceptable level (i.e. maintaining CCG minimum Performance Standards).

4.1.2.16 **Preliminary Analysis: Recommendations**

This final step in the Preliminary Analysis seeks CCG management concurrence and acceptance of the findings and may include recommendation(s) for action by management with respect to SAR response delivery or to other aspects of the SAR system such as prevention, education, regulation and enforcement that could be referred to responsible organizations.

NOTE: A final stakeholder consultation or communication should be undertaken to inform stakeholders of the outcome of the Preliminary Analysis and decisions taken or recommendations being made with respect to issues or concerns they have raised. **It is not necessary that stakeholders agree with the results of the analysis or the actions proposed and recommended, but it is important that they understand the process by which these determinations were made.**

The following pages contain a sample guide for initial stakeholder consultation and a checklist to record completion of Risk Identification and Preliminary Analysis tasks.

4.1.2.17 **Initial Stakeholder Consultation Guide (sample)**

Stakeholders are given a copy of environmental scan information on the SAR Area to review and are asked if they have any comments or questions, or if there is additional information they feel is pertinent in accurately describing the geography and demographics of the area, with emphasis on the maritime environment and activities.

They are shown several Power Point slides that depict historical statistics and data on SAR incidents that occurred in the area over the previous five years. Commentary by Team members will speak to seasonal distribution of incidents, proximity to shore of incident occurrence, response times and preparedness measures for individuals to survive for at least as long as the response time.

Depending on the level of engagement by the stakeholders, the following points may be raised in leading question examples to stimulate discussion:

- Having viewed the graphs on seasonal distribution and incident locations, do you feel that there are any trends or reasons to explain the incident distribution?
- What high and low risk maritime activities (if any) occur in the area?
- In your opinion, has the level of SAR risk increased, decreased or remained unchanged over the past five years? Why do you think so?
- How do you feel about the degree to which the maritime risks identified are being addressed by all parties: CCG, Regulatory (e.g. TC), Enforcement (e.g. RCMP), and mariners)?
- How do you think risks associated with maritime activities in this area can be effectively managed?
- Are you aware of all the SAR response resources available to serve the area? Do you feel that there are sufficient SAR resources to manage the risk in this area? Why, or why not?
- If you were to experience a maritime emergency, how would you activate the SAR system?
- Do you perceive a trend that mariners in the area are better equipped and trained to deal with an onboard emergency than they were five years ago? What influences your opinion?
- How do you view the responsibilities of individuals involved in maritime activities to prepare themselves (e.g. training, equipment, vessel condition, decision-making), to operate safely in the marine environment and to deal with emergencies that occur, including being able to survive long enough and assist in being rescued?

Table 4 - Risk Identification Checklist

Scope of Analysis Defined?	Yes - No
Environmental Scan Prepared/Updated?	Yes - No
Risk Scenarios Developed?	Yes - No
Area SAR Risk Profile Developed and Presentation Prepared?	Yes - No
Initial Stakeholder Consultation and Analysis Conducted?	Yes - No
Preliminary Analysis Completed?	Yes - No
Preliminary Analysis Decision?	End Analysis/Further Analysis
Follow-on Stakeholder Consultation and Communication?	Yes - No - N/A

4.1.3 Risk Estimation

For RAMSARD applications where a Preliminary Analysis determines that further analysis is required, either because of management direction to consider alternative CCG SAR response resource configurations or because existing SAR response capabilities have proven recurrently inadequate in meeting the CCG minimum Performance Standard, the area risk scenarios will undergo Risk Estimation in order to:

- Estimate the likelihood of the previously identified risk scenarios occurring; and
- Estimate the range of consequences associated with each scenario.

The first decision to be made is to determine the methodology that will be used to estimate the likelihood and impact of the risks. For example, will estimates be based on historical data, models, professional judgement, other forms of technical analyses, or on a combination of methods? In the case of a RAMSARD Analysis, historical data (SISAR incident data) and professional judgement will be the bases of the methodology. Industry accident rate estimates and environmental scan activity data for ferries, cruise ships, cargo vessels, airliners, etc. will supplement the SISAR data for rare, major SAR incidents.

NOTE: Although SISAR data is considered suitably accurate only post-2008, the period of historical data will increase with time, and so will the validity of that data in representing the best estimate of likelihood and range of consequences.

If the level of interest or concern is high, or if credibility with key stakeholders is low, the chances of decisions being challenged increase. If estimations or results might be challenged, it is necessary to describe in detail how the associated likelihood and impacts were determined. . Defining the methodology is also necessary to avoid conflict between technical experts and laypersons when evaluating the results of such analyses.

The choice of method will reflect timing, resources, availability of data, the need for accuracy or the possible need for some statistical portrayal of the data, and the acceptance of the methodology by key stakeholders. An additional consideration is that the uncertainties associated with estimates, as well as the assumptions included in the analyses, should be clearly stated. A third-party review may be considered if we need to lend greater credibility to the results.

Before moving on to the next step Risk Evaluation, these questions should be answered:

- Are the uncertainties associated with the estimates acceptable? Can decisions as to the acceptability of the risks be made comfortably based on these estimates, given their associated uncertainties?
- Was the data used in the Analysis adequate, or does more precise data need to be acquired (at an additional cost in dollars and time)? Is more precise data available? Would acquiring more precise data affect the decision?
- Is the methodology used for the Analysis appropriate? Should the Analysis be redone using a different method?
- Do the estimates of likelihood or impact raise any new issues with the Analysis Team or with stakeholders? This could occur if the estimates turn out to be far higher than expected.
- Have any new risks been identified as a result of these analyses?
- Has the scope of the overall analysis changed?

The key question is: **"Is the Analysis Team comfortable making recommendations based on the information now in hand?"**

Note: Any completed stakeholder analyses may need to be revised in light of this new information. Is the level of concern the same, given that stakeholders now have a better idea of the likelihood and impact of the risk situations? Is the level of concern on the part of the Analysis Team the same? Concerns may have changed as a result of the Analysis, perhaps calling for a change in approach.

4.1.4 Risk Evaluation

In this step of the process, an evaluation will be conducted to assess whether the risks are acceptable or not in terms of the benefits of the activities leading to the risks and in terms of the expressed needs, issues, and concerns of affected stakeholders (including the CCG).

So far in the Analysis, only the risks (or expected losses) associated with the activity have been considered.

Before making a decision about the acceptability of the risks, the benefits associated with the activity leading to the risks need to be considered. Decisions hinge on the trade-off between the benefits and the risks. The risks may be acceptable if the benefits are sufficient.

This evaluation will help determine whether:

- The identified risks are acceptable, so the activity proceeds without any need for further mitigation;
- The identified risks are not acceptable at any level; or
- The activity might be acceptable, but risk mitigation measures should be applied to reduce the risk to a lower level or, if possible, benefits of the activity should be increased.

If the risks are considered acceptable at their current level, the Analysis can be ended, although the situation will need to be monitored for possible future changes.

If the risks are deemed unacceptable at any level and if the activity is not mandatory or can be avoided, then the activity may need to be abandoned. This would end the decision process.

If the activity is deemed acceptable if the risks can be reduced or the benefits increased, the process moves on to the next step of identifying and evaluating alternative mitigation strategies.

Note: There may be a need to return to previous steps if the data is deemed insufficient for making these decisions, or if new issues or risks have been identified.

4.1.5 Risk Control

In this step of the process, alternative means for reducing the likelihood or the impact of the risk scenarios (developed during Risk Identification) need to be identified and evaluated.

One of the problems in decision-making in general is the tendency to look only at readily-available or familiar solutions for dealing with risk issues. There is a need for creativity in order to identify a broader range of options that might help better achieve risk management objectives. There are a number of tools available to aid in this effort, for example means-ends networks, decision trees, and facilitated groups.

There are six broad types of strategies for reducing risk:

- Avoid the exposure to risk altogether. The only way to reduce risk to zero is to either eliminate the hazard generating the risk or eliminate exposure to that hazard. The maritime environment represents a hazard in itself, even under favourable weather and sea conditions; human beings are not naturally aquatic creatures and need support measures to survive in that environment. Risk avoidance is the goal of prevention programs.
- Put in place measures that will reduce exposure to the hazard. This is a degree of risk avoidance.
- Put in place measures that will reduce the frequency (likelihood) of the loss occurring, such as lifeboats and life jackets. This is considered risk management or control.
- Put in place measures that will reduce the consequences (impact) of the loss if it does occur. SAR response seeks to do this by saving lives at risk in SAR incidents.
- Duplicate assets.
- Transfer the obligation to deal with a risk situation to someone else.

There is usually more than one risk-reducing option available to deal with a risk situation, and multiple strategies may need to be implemented to reduce the risks to an acceptable level.

Once alternative measures for mitigating the risks have been identified, they need to be evaluated in terms of their effectiveness in reducing the risks and their impact on other objectives (including cost).

In the ice storm example used in the Risk Scenario section, salting the sidewalk will have the beneficial effect of eliminating the ice, but large amounts of salt have a detrimental effect on the environment. Although eliminating the ice eliminates the likelihood of slipping, it exposes a new hazard: the large hole in the sidewalk created by the salt could cause someone to trip.

In a maritime environment context, total risk avoidance would mean not going out onto the water at all. This solution would be 100% effective in avoiding involvement in a maritime SAR incident, but completely impractical for those who make their living on the water. A measure to reduce, but not eliminate, exposure to the hazard of being on the water would be to avoid venturing out when adverse weather or sea conditions exist or are forecast. This is more practical than the first option, but sometimes requires a trade-off between earnings level and risk to personal safety.

This risk management process is designed to provide decision-makers with information about the trade-offs that arise in choosing amongst alternative courses of action, including alternative resource configurations. However, it does not tell decision-makers which option(s) to choose or what to value. The job of the analyst is to identify the range of options and provide decision-makers with relevant information about the trade-offs inherent in choosing amongst the options.

Before a risk control strategy has been decided upon, analysts need to assess how effective this control strategy could be in reducing the risk and how much risk would remain after it is implemented (this is called residual risk). Once the residual risk is estimated, its acceptability will need to be assessed through a return to the Risk Evaluation step.

If the residual risk is acceptable, the Analysis can be ended, but the situation should still be monitored. If the residual risk is unacceptable, alternative or increased mitigation measures will need to be considered. It is better to add control strategies one step at a time, rather than all at once. Otherwise, risks may be reduced more than necessary for it to be acceptable to stakeholders, with more resources than is necessary. The resources that would have been saved might have been better utilized elsewhere else.

4.1.6 Action and Monitoring

In this step of the process:

- Decisions must be made regarding the implementation of the chosen risk control options;
- The effectiveness of this process must be evaluated to determine whether it provides sufficient information for making informed judgements; and,
- An ongoing program for monitoring the risk control options must be developed and implemented.

The key to successfully implementing the chosen risk control strategies is to first develop an implementation plan.

If a risk control measure was decided upon, an implementation plan will be developed. Implementation plans will consider timing, resource availability, technical issues, manpower, training and any other issues that need to be considered in light of the decision. A communications plan will be developed to accompany the implementation plan. This plan would include considerations such as:

- Who will be involved in the implementation?
- What will the timing be? Is timing an issue?
- With whom might there be a need to communicate prior to, and during the implementation?

The monitoring program's function is to:

- Detect and adapt to changing circumstances related to the affected area;
- Ensure that the risk control measures put in place (including policies and programs) are achieving the expected results;
- Ensure that control measures and communications have been implemented properly; and
- Verify the correctness of the assumptions made in the Analysis.

There may be changing circumstances within the area under review. For example, this could include changes to the international SAR agreements Canada has with other nations, changes to the SAR policies or programs, changes to vessel traffic, seasonal or climate change. Changes to the environment of the area under review can generate changes to the risks; old risks may disappear, or new risks may arise.

Expectations may be defined as performance standards against which actual results are measured. In the case of maritime SAR response, the CCG Performance Standard is the overarching standard to be achieved. If this standard is not met, adjustments will need to be made. This could mean implementing a new risk control strategy.

Sometimes a deficiency can result from the implementation of the risk control program, and not from the program itself. A check will need to be carried out to ensure that the risk control option (e.g. policies, procedures or programs) have been implemented properly. This may mean verifying that other stakeholders are meeting obligations accepted by them.

During the Analysis, a number of assumptions were made. They might relate to:

- The likelihood of the event occurring;
- The range of possible consequences associated with the event;
- The effectiveness and cost of mitigation strategies; and,
- The acceptability of risks.

A number of assumptions have been made about the effectiveness of the risk control measures put in place. The outcomes need to be monitored to assess whether the implemented strategies are achieving the expected results. If expectations are not being met, adjustments to the program may need to be made.

It is important, whenever possible, to routinely verify the assumptions used in the Analysis. If the assumptions prove correct, this will lend greater credibility to the Analysis and to the accompanying decisions. If they prove not to be valid, there may be a need to redo or adjust the Analysis, possibly leading to different conclusions.

Lastly, a review of the risk management decision process should be undertaken so lessons can be learned for the next time. These reviews are very beneficial for developing expertise in the decision process, and for improving its efficiency and effectiveness in accomplishing its objectives.

A simple, yet effective method for conducting this review is to convene the Analysis Team and ask the questions:

Given what we know now:

- What worked well?
- What did not work well?
- What would we do differently next time?

These reviews are important to ensuring continuous improvement in risk management decision-making. They also provide an excellent library of lessons learned to aid those new to the decision process.

Whether a risk control measure was implemented or not, there is a need to have a monitoring program that both measures the response system and the exposure of activities. The system measures shall be in accordance with the SAR capacity and SAR capability matrix used to assess response measures.

SAR incident data will continue to be collected and entered into the SISAR system.

The activity levels will be monitored; this way, SAR incident data can be related to activity types and incident rates can be established. This will allow rigorous analysis of information at the next planned review.

Annex A Documentation Template

This section provides some guidance with respect to what needs to be documented throughout the RAMSARD process.

What follows are the documentation requirements for a major study with potential legal implications, where decisions may need to be defended in a court of law. Although the requirements are very comprehensive for this type of situation, the majority of decision situations will not generate this level of documentation.

For most analyses, enough documentation needs to be provided so that, for example, an outside manager can understand:

- What the problems and associated risk issues are;
- Who the stakeholders are and what form of consultations, if any, were undertaken with them;
- The results of these consultations;
- What, and why, decisions were made, throughout the process; and
- How and why the particular options for dealing with the identified issues were chosen.

Essentially, the documentation should describe the case for the decision(s) in as few words as practical.

A.1 INITIATION DOCUMENTATION REQUIREMENTS

The documentation should define in detail the fundamental objectives of the organization.

- Define the problem or opportunity that triggered an initiation of the risk management decision process;
- Define the risk scenarios associated with the problem or opportunity, and who these issues are associated with (e.g. CCG, general public, other stakeholders);
- Provide details of any assumptions being made to identify the problem, opportunity or associated issues;
- Provide an initial list of stakeholders related to the specific decisions under consideration; and
- Describe the Analysis Team and their roles and responsibilities.

Note: There may only be a need to document this once as the fundamental objectives of the organization should not change much over time. However, should changes be made to priorities or objectives, the documentation should be updated to reflect these changes.

A.2 RISK IDENTIFICATION (PRELIMINARY ANALYSIS) DOCUMENTATION REQUIREMENTS

A detailed description of each risk scenario needs to be provided, including who raised the issue, why is it an issue for them, what is their level of concern regarding the issue, whether addressing the issue is within the scope of CCG's mandate, etc.

More specifically, the following should be documented:

- Details related to each risk scenario, including a description of the event, its associated consequences and any related assumptions being made;
- Details related to any analyses undertaken to identify risk scenarios, description of how were risks identified (e.g. through analysis of SISAR incident data, expert judgement of the Analysis Team, environmental scan);

- Details of any communications or consultations with stakeholders related to the identification of risks;
- Updated stakeholder analysis, or initial stakeholder analysis if one has not previously been done;
- Details related to privacy issues, if any, related to the data or to stakeholder analyses; and
- Details of any decisions taken, including reasons for dismissing issues, objectives related to any further analyses (if further analyses are required).

If the recommendation is to end the study at the Preliminary Analysis stage, the reason for doing so must be explained. This will be included in the RAMSARD Analysis Report prepared at the end of a Preliminary Analysis, if it is deemed to satisfy the requirements of the mandated study.

A.3 RISK ESTIMATION DOCUMENTATION REQUIREMENTS

The documentation required for this step should describe the methodology used to estimate the frequency (probability) and consequences, including a description of any data utilized in the analyses. It should include:

- Details of the assumptions made in the analyses;
- Results of the analyses;
- Details of the uncertainties (statistical and other) associated with the estimates;
- Reasons for decisions, if it decided that more analysis is required (e.g., the uncertainties associated with the estimates are considered too large); and
- Updated Stakeholder Analysis.

A.4 RISK EVALUATION DOCUMENTATION REQUIREMENTS

The documentation for this step should include an executive summary for decision-makers of all risk scenarios, risk estimates (benefits, costs, etc.), and stakeholder objectives (needs, issues, concerns).

At this step, a decision will be made with respect to the acceptability of the identified risks. It can be beneficial to give decision-makers a summary of what is known at this stage, as well as what remains unknown, to aid in their making a decision about whether a risk is acceptable; whether some form of risk control needs to be applied; or whether there is a need for more information before such decisions can be made. Information provided should include:

- Details related to any stakeholder consultations undertaken regarding the evaluation of risks and benefits; and
- Updated stakeholder analysis.

A.5 RISK CONTROL DOCUMENTATION REQUIREMENTS

Documentation for this step should include:

- A description of all control strategies that have been considered;
- A description of any constraints impacting the choice of control measure(s);
- For each considered control measure, details of its expected effectiveness, cost and impact on other stakeholder objectives;
- Details related to any assumptions and uncertainties inherent in the analyses;
- Details of communications or consultations with stakeholders;

- Implementation plan related to risk control strategies, including details of any contracts related to the transfer of authority or financial obligations;
- Monitoring plan; and
- Details of any financial considerations related to residual risk.

A.6 ACTION / MONITORING DOCUMENTATION REQUIREMENTS

Documentation for this step should include:

- Implementation plan;
- Project management plan (if any);
- Monitoring plan; and
- Results of monitoring program.

Annex B Communication and Consultations

B.1 COMMUNICATIONS, CONSULTATIONS AND DECISION-MAKING

The 2007 SAR Needs Analysis identified a lack of timely consultation with stakeholders, partners and clients.

The intent of this appendix is to provide guidance for consultation and risk communications, including those consultations expected through each stage of the Risk-Based Analysis methodology. A more detailed discussion is contained within the CCG National Strategies Risk Management Guidelines (RMG).

Risk Communications are defined as a set of communication and consultation activities designed to support the decision process by providing information necessary for defining stakeholder issues and for understanding the trade-offs inherent in the decision-situation.

The concept of Risk Perception is important in that different stakeholders will view each risk through their own frame of reference. Consultations will provide decision-makers with a better understanding of the values, objectives and emotional qualities that form the basis of the stakeholders' perception of risk.

Through consultations, stakeholders will perceive that the decision process is systematic, with a broader range of options and a framework for evaluating those options. A structured decision process and effective communications should result in the improved credibility of decision-makers with other stakeholders and a greater likelihood of reaching a broader consensus.

B.2 PRINCIPLES

- Where possible, these communications will be conducted through existing mechanisms, both at Headquarters and within regions;
- A Stakeholder Analysis (RMG, 2.9.1) shall be conducted early in the process to identify stakeholders, level of interest, issues and other relevant information;
- Consultations shall be structured not just to inform stakeholders of intended actions, but to gather from stakeholder insight, perspective and information otherwise not available to decision-makers; and
- Not every decision requires extensive analyses or consultations. More complex decisions with higher risks, or with a higher level of concern on the part of stakeholders, require broader and deeper consultations, with attendant documentation.

B.3 NATIONAL COMMUNICATIONS/CONSULTATION

- Internal to CCG, through discussion between SAR team members, other National Strategies and Operations teams, with methodology approved by and decision-making done by Operations Executive Board (OEB) and CCG's Management Board;
- Sharing of methodology and opportunity for input appropriate by National Search and Rescue Committee, National Search and Rescue Secretariat (NSS) and National Marine Advisory Board (NMAB);
- Consultation with SAR partners in CAF (national liaison) and CCGA; and
- Communication via CCG website and other media.

B.4 REGIONAL COMMUNICATIONS/CONSULTATION

- Internal to CCG, through discussion between SAR team members, other National Strategies and Operations teams;

- Sharing of methodology and opportunity for input to process at various stages of process (beginning, during and at conclusion) with Regional Marine Advisory Board, Local Marine Advisory Council, Canadian Marine Advisory Council, Recreational Boating Advisory Council and other stakeholder groups;
- Dialogue with potentially affected communities (e.g. when considering the addition, removal or change of resources); and
- Consultation with SAR partners in CAF (through the JRCC) and CCGA.

B.5 SUMMARY OF COMMUNICATIONS AND CONSULTATIONS THROUGH EACH STAGE OF THE RISK-BASED ANALYSIS METHODOLOGY

I Initiation

Begin identification of stakeholders and create stakeholder list (national, regional, area) with updated contact information - this will continue throughout process

Begin initial contact with key stakeholders; foster understanding of methodology

II Risk Identification

Begin Stakeholder Analysis, consultation and information gathering - gauge level of interest and issues, seek insights, perspective and information otherwise not available

Consult as to accuracy of weather conditions to ensure key aspects are identified

Consult as to user profiles - accuracy of data, gain consensus regarding estimates (e.g. pleasure craft volume), and identify probable future trends

Share SAR incident data with SAR partners (e.g. CAF, CCGA) and clients - focus on information that is most relevant to these groups (e.g. response times for partners, incident trends if identified, how lives are lost) and verify whether data is consistent with expectation of SAR service

III Risk Estimation

Engage stakeholders and partners in assessment of current status of SAR Delivery

Consult with partners as to accuracy of SAR capacity and coverage factor (availability and response time estimates) and verify whether these are consistent with historical SAR incident data

Consult with stakeholders (SAR Program expertise, CCG Operations, CAF, CCGA, other local resources) as to accuracy of SAR Capability Matrix

Consult as to the final estimations for the area

IV Risk Evaluation

Gain input into stakeholder perception and assess stakeholder acceptance of risk; identify and document stakeholder issues

Hold broader and deeper consultations with relevant documentation for higher risk, more complex circumstance or probable controversial outcome (e.g. reallocation of resources)

V Risk Control

Involve stakeholders in identification and evaluation of risk control options

Assess stakeholder acceptance of residual risk

VI Action and Monitoring

Engage stakeholders in the development of implementation plan

Communicate with stakeholders and public prior to, during and after implementation.

Annex C Risk Assessment Tools

C.1 GENERAL

The following Risk Assessment Tools are provided to assist in carrying out a full RAMSARD analysis where management has directed consideration of changes to CCG SAR response resources assigned to or serving an area, or where existing SAR response services are recurrently failing to meet CCG minimum Performance Standard. In these instances, it will be necessary to take proceed with a completely news assessment of risks in the area under review and evaluation of new Risk Control measures (i.e. an alternate SAR response resource mix) to mitigate those risks. It is important to note that use of these tools will not, by itself, produce the solution required to solve the problem; expert analysis will be required to develop one or more alternate SAR response delivery options for recommendation to management. The following Tools will simply assist in assembling the necessary data and information in order to facilitate the process of analysis.

C.2 NATIONAL SAR RISK ESTIMATION MATRIX

This National SAR Risk Estimation Matrix is used as a template to proceed with the necessary analysis of the area under review. It is used as a general check of the risk levels found in the area under assessment.

The National SAR Estimation Matrix will be completed by National Headquarters and updated annually. Once the update is complete, it will be shared with the regional offices.

The matrix is constructed using a standard risk format, as *per National Strategies - Risk Profiling: Risk Assessment Place-mat* that places the impact of the incident on the vertical axis and the likelihood on the horizontal axis. The likelihood and impact scales in the Risk Assessment Place-mat, which are used to assess corporate crises, were modified in the National SAR Estimation Matrix to reflect the specifics of SAR.

Impact in the context of SAR is limited to loss of life, as other impacts are not directly associated to the primary mandate of the SAR system and are more difficult to quantify. While additional benefits result from the actions taken to save lives (including reductions in loss of property and environmental damages), these benefits are not part of the national SAR objective and can create confusion regarding the primary mandate of the SAR system.

Table 5 – Impact

Impact	
Extreme	More than 50 lives lost in incident.
High	More than 10 lives lost in incident.
Moderate	More than 5 lives lost in incident.
Low	One to five lives lost in incident.
Negligible	No lives lost in incident.

Likelihood is a measure of the frequency or interval at which events can be reasonably expected to occur.

Table 6 – Likelihood

Likelihood	
Almost Certain	1 incident or more per week
Likely	1 or more incident per month
Moderate	1 or more incident per year
Unlikely	1 incident every 10 years
Rare	1 incident every 25 years or more

Recorded SAR incidents are to be plotted on the National SAR Risk Estimation Matrix. To do so, each incident type is assigned a numerical reference.

The existing SAR statistics will be used as an approximation when categorizing the risk scenarios to be included in the SAR Estimation Matrix. By grouping the incidents by vessel category, some broad assumptions can be made about the number of persons on board and lives at risk. For the purposes of identifying a risk profile for an area, this is the most important factor.

The number of persons on board does not automatically assume that they are all at risk in every event. Data on the number of persons on board and lives at risk should be available from the SISAR system. When this data is available, the number of lives at risk will be used to categorize the events on the risk matrix.

If the data is absent, all reviewers will be required to use the following assumptions for determining consequences:

- A pleasure craft has four persons on board;
- A fishing vessel has five persons on board;
- A commercial vessel has twenty persons on board;
- A cruise ship, ferry or oil rig has more than fifty persons on board;
- A small aircraft carries ten or fewer persons; and
- A large aircraft carries more than ten persons.

Later in the process, the same incidents will be categorized by type (such as fire, disabled, aground, taking on water, striking/collision, overdue), as this factor will be taken into account in assessing the capabilities that must be considered when determining appropriate SAR coverage.

Table 7 - Category

CATEGORY			
1	M1 - Pleasure Craft	15	M3 - Major Ferry - Oil Rig
2	M2 - Pleasure Craft	16	M4 -Major Ferry - Oil Rig
3	M3 - Pleasure Craft	17	A1 - Small Aircraft
4	M4 - Pleasure Craft	18	A2 - Small Aircraft
5	M1 - Fishing Vessel	19	A3 - Small Aircraft
6	M2 - Fishing Vessel	20	A4 - Small Aircraft
7	M3 - Fishing Vessel	21	A1 - Large Aircraft
8	M4 - Fishing Vessel	22	A2 - Large Aircraft
9	M1 - Commercial Vessel	23	A3 - Large Aircraft
10	M2 - Commercial Vessel	24	A4 - Large Aircraft
11	M3 - Commercial Vessel	25	H1 - Humanitarian
12	M4 - Commercial Vessel	26	H2 - Humanitarian
13	M1 - Major Ferry - Oil Rig	27	H3 - Humanitarian
14	M2 - Major Ferry - Oil Rig	28	H4 - Humanitarian

Although a maritime response was delivered for the humanitarian incidents captured above, it is important to note that humanitarian incidents are specifically mentioned in the National SAR Manual (IAMSAR Vol 4 - Canadian or CAMSAR) as a secondary and complementary SAR tasking with the following caveats: SAR units are to be provided when and where available, if there is no other competent authority and if such tasking will not unduly compromise SAR coverage (Section 3.04.3). This description makes it clear that although responses may be delivered for humanitarian incidents, their associated data is not to be used as criteria for resource planning. Their inclusion in RAMSARD is purely educational and illustrative of the current workload on SAR resources, with the explicit understanding that these incidents will not form part of the risk that needs to be addressed when assessing SAR coverage. This distinction is critical and is not well understood by many stakeholders so key messages to that effect must be included in communications and consultations plans.

Air incidents that occur over water are the only air statistics that are considered in this risk estimation.

The categories of incidents listed above are placed on the matrix below. Incidents with the highest probable impact and frequency are considered to be highest risk and they will appear in the upper right quadrant. This National SAR Risk Estimation Matrix is a tool for national policy planning only. None of the figures or placements from the national matrix can be directly transferred to the area under review - only the data specific to the area under review can be used for the RAMSARD analysis.

Table 8 - National SAR Risk Estimation Matrix (example; not real data)

Impact	Extreme	13, 14, 21				
	High		15, 22			
	Moderate		9	10	5	
	Low	23		18, 25, 26	6, 16, 19, 20, 27, 28	1, 2
	Negligible	24			7, 8, 11, 12	3, 4
	Rare	Unlikely	Moderate	Likely	Almost Certain	

Later, when looking at resource requirements, the matrix will be modified as follows:

- Remove the humanitarian incidents.
- Highlight the requirement to have some level of preparedness for rare events.

Table 9 – National SAR Risk Estimation Matrix for resource requirements (example; not real data)

Impact	Extreme	13, 14, 21				
	High		15, 22			
	Moderate		9	10	5	
	Low	23		18,	6, 16, 19, 20,	1, 2
	Negligible	24			7, 8, 11, 12	3, 4
	Rare	Unlikely	Moderate	Likely	Almost Certain	
	Likelihood					

Note: The RAMSARD process is not a relative risk tool, and should not be used to compare area risks to other area risks or to the national risk matrix. Each area has unique risks and may have unique resources to cover those risks. During consultations with stakeholders, the national risk matrix will be shown only to indicate that it is complete and to show that local figures are used in the Analysis (as opposed to the national figures being applied to local area assessments).

C.3 AREA SAR RISK ESTIMATION

Although it uses the National SAR Risk Estimation Matrix as a template, the Area SAR Risk Estimation Matrix will only consider the specific area information gathered during the Risk Identification stage, including user information and the historical SAR incident data for that specific area.

While the impacts may be the same for various incident types, they may vary in other cases. For example, an area where fishing is mainly done by small vessels with a two-person crew might have a different profile than an area where the vessels are larger and have an average crew of twelve.

Probability may vary greatly by area. In the Area Risk Estimation Matrix, SISAR data will only be used for incidents with a likelihood of incidents daily to yearly, which covers the Almost Certain to Moderate likelihood categories.

For the less likely events, a national incident rate will be developed based on incident data looking back as far as possible in waters of Canadian interest. If the existing data is considered insufficient, areas which are considered to have equivalent risks or global industry-wide risks associated with particular activities can be researched. National will develop incident rates for major and rare M1 and M2 events. For example, it will be determined that there is a probability of a specific type of incident happening once in every 10,000 bulk carrier transits, or once in every 25,000 tanker transits, or one in every 200,000 commercial airline flights.

Using traffic statistics for the various traffic types ships and aircraft in the area under review, the Analysis Team will apply the national incident rates to determine whether the incident type is relevant for the Area Risk Estimation Matrix and if so, with what frequency.

In the initial matrix, humanitarian incidents will be included to give a full appreciation of risks and workloads being experienced. They will then be removed from the grid when assessing the coverage needs.

Table 10 – Area SAR Risk Estimation Matrix (example; not real data)

Impact	Extreme	13, 14, 21				
	High		15, 22			
	Moderate		9	10	5	
	Low	23		18, 25, 26	6, 16, 19, 20, 27, 28	1, 2
	Negligible	24			7, 8, 11, 12	3, 4
		Rare	Unlikely	Moderate	Likely	Almost Certain
		Likelihood				

Any incident type falling in the upper right-hand quadrant of this matrix is of immediate concern. However, it is not very probable that any incident type will fall into the high frequency and high consequence range, as the data has been gathered with a SAR system in place.

Once the incident types are rated and placed in the matrix, including the rare events using the recommended national incident rates, the reviewer should study the matrix to note the rankings of the various types of events. During consultations, the reviewer will give a short explanation regarding the statistics presented in the Area Risk Estimation Matrix and the method used to validate the results of the matrix.

At this point, the reviewer may make adjustments to the matrix to reflect trends or changes in context that may alter the identified risk profile(s) going forward. **However, adjustments may not be made based on perceptions alone; they must be based on a solid, professional, substantive rationale.** Any such change must be documented as to what was modified and why. In every case, the original matrix information must be part of the records and accompanied by its revised version, with a written explanation for the adjustment(s) made.

Adjustments to the matrix cannot generally be made on environmental conditions. Stakeholders will have to be reminded that the weather, tides, and currents existed when the historical incidents took place and that their impact on incidents outcomes is already reflected in the incidents statistics. Modifying the frequency or impact in the matrix to account for environmental hazards would basically mean that environmental hazards would be considered twice for the same event, which would exaggerate the results.

If stakeholders see that adjustments can be made without necessarily being driven by hard data, they may wish to adjust the matrix based on their perception of the risks. Appropriate documentation will help the Analysis Team explain to stakeholders why changes were made. When the stakeholders perceive that the risk estimation is a data-driven exercise, they are more likely to accept the results.

Changes to the risk matrix may not be made during a consultation session. If new information is offered by the stakeholders, the Analysis Team should accept it for review. After review, a determination can be made to alter the Area Risk Estimation Matrix following the guidance on justification and documentation above.

This approach does allow for information exchange during the consultation, which may lead to further review by the assessor. However, it ensures that a group of stakeholders, no matter how well intentioned, cannot secure a substantive change to the Area Risk Estimation Matrix based on risk perceptions, recent events or other considerations that may not be entirely related to risk.

The reviewer must create a text to accompany the matrix. At a minimum, it will include information on:

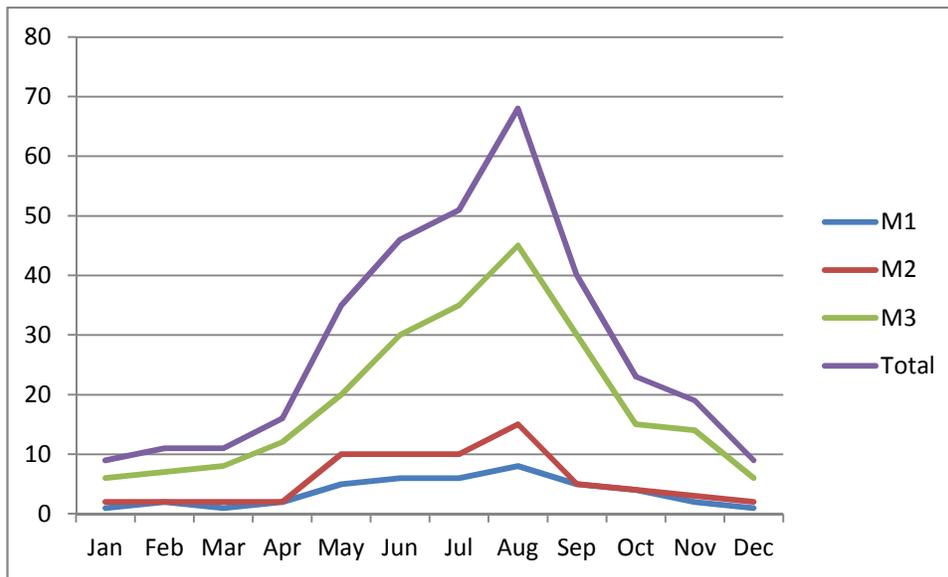
- The methodology used to develop the risk matrix;
- Any uncertainties associated with the data supporting the matrix; and,
- The limitations in the current display of information in the matrix

A speaking point would also remind stakeholders that the statistics shown in the Area Risk Estimation Matrix take into account the current SAR resources in place. The existing resources did contribute to reducing the consequences of incidents, or managed incidents at the M4 or M3 stage and prevented their escalation to an M1 or M2 stage. Using this data is still the best approximation available for identifying the risks associated with marine activities in the area.

Other tools that may be used during the Analysis and the consultations are a table and a graph showing the average incidents per month. The incident data used for populating the Area Risk Estimation Matrix are plotted by average number of incidents per month in both the table and the graph (see below for example). This will help the Analysis Team determine whether there is a high season and low season, and whether shoulder seasons need to be considered.

Table 11 - Average Incidents per Month based on 2001 to 2011 Data (example; not real data)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
M1	1	2	1	2	5	6	6	8	5	4	2	1
M2	2	2	2	2	10	10	10	15	5	4	3	2
M3	6	7	8	12	20	30	35	45	30	15	14	6
Total	9	11	11	16	35	46	51	68	40	23	19	9



During consultations, stakeholders will be reminded that numbers of incidents alone cannot be used to determine capability and capacity required, as often in seasons where the incident load is lower, the conditions are harsher and incidents may take longer to resolve.

C.4 AREA SAR CAPACITY MATRIX

SAR capacity is described as the availability and response posture of potential responders and resources in a specific area where SAR response can be provided. This matrix is completed for the SAR area only and includes all the potential resources within that area.

Although some of the potential responders will not be resident in the area under review (e.g. RCAF air resources), such resources are still to be included in the capacity matrix. Should the distance between the home of the resource and the area under review require commentary as to response time or endurance, it will be considered in the Capability Relevance section.

In the risk estimation phase, all of the incidents were broken out by month to determine whether the area under review has seasonal variations that need consideration (see section above). If significant seasonal variations are noticed, the SAR capacity will be reviewed according to these variations. For example, this recognizes the current practice of increasing SAR coverage for areas of high recreational traffic during the summer months.

The capacity matrix below provides an estimation of resource availability by season. These estimations are based upon the best available information, including SAR incident data for the area that illustrates resource utilization and participation, CCG vessel activity information, published service standards, mariner profiles for the area, interviews with JRCC personnel, and consultations with SAR partners and stakeholders.

Season Limits:

- Shoulder (Spring/Fall) - April/May and October/November
- Summer - June to September
- Winter - December to March

For the purposes of consistency, the RAMSARD process will use the same definitions of SAR response resources as the SAR Tasking Policy. This includes four categories of mobile facilities available for SAR response. The first three categories are considered SAR units, ranging from Primary vessels to CCGA, and the fourth category is made up of civilians, including vessels of opportunity:

- Search and Rescue Unit - Primary - A federal SAR aircraft or vessel established and equipped specifically for SAR, with SAR trained crew onboard.
- Search and Rescue Unit - Secondary - All units of the federal government that are not primary SAR units, but which may be tasked to aid in the resolution of a SAR incident.
- Search and Rescue Unit - Other - Units other than primary or secondary SAR units, which participate in SAR activities when required. This includes non-federal government units, civilian agencies, volunteers, and partially-funded organizations such as the CCGA.
- Civilian volunteers - Vessels of opportunity or other civilian facilities that can be directed under the Canada Shipping Act, 2001 or requested to assist with a SAR operation.

Table 12 – Capacity Matrix- availability and response posture of potential responders (example; not real data)

Resource	Shoulder	Summer	Winter	Notes
Primary				
CCG Lifeboat	100%	100%	100%	Crew on station 0800-1600 Minimum 30-minute standby 24/7.
CCG Ship Planned*	50%	80%	25%	Multi-tasked in area, but designated as SAR coverage.
RCAF Rotary Wing	100%	100%	100%	30 min 08-17 - M to F 2 hrs otherwise and holidays.
RCAF Fixed Wing	100%	100%	100%	30 min 08-17 - M to F 2 hrs otherwise and holidays.
Inshore Rescue Boat	0%	100%	0%	30 min during operational cycle.
Secondary				
CCG Ship Opportunity	20%	20%	20%	Tasked in area and not designated as SAR coverage.

Resource	Shoulder	Summer	Winter	Notes
RCMP Vessel	25%	25%	25%	Periodic patrols in area - no standby, immediate response if available.
Parks Canada	25%	50%	0	Day-time only in summer - no standby, immediate response if available.
CCG Helicopters	%	%	%	Visual Flight Rules (VFR) only, no standby.
RCAF Rotary Wing	%	%	%	Instrument Flight Rules (IFR), no standby.
RCAF Fixed Wing	%	%	%	IFR, no standby.
PAL - Fed. Gov't Charter	%	%	%	IFR, no standby.
Other				
CCGA Unit 1	90%	90%	80%	Dedicated vessel. Some lack of crew availability - 30-minute standby 24/7.
CCGA Unit 2	33%	50%	0	Owner operator. Not available off season - no standby, immediate response if available.
Civil Air Search and Rescue Association (CASARA)	%	%	%	Owner operator, no standby.
Private Rotary Wing (e.g. Cougar, CHC)				
Civilian				
Vessel of Opportunity (VOO) Fishing	50%	10%	75%	No summer commercial fishery in this area, immediate response if available.
VOO Commercial	25%	50%	25%	Cruise ships in summer. Tug and barge all year. Immediate response if available.
VOO Pleasure	50%	100%	25%	Limited pleasure craft traffic in poor weather months, immediate response if available.
Aircraft of opportunity				

The capacity matrix above is not all inclusive. The reviewer will be responsible for completing this matrix fully for the area under review and validating it with stakeholders.

C.5 SAR CAPABILITY RATING CRITERIA

SAR capability is described as the ability of resources to provide response to SAR incidents. Where possible, the SAR Capability Rating is linked to a standard (e.g. SAR Service Standard, CCG Statements of Operational Requirements, CGFO 207 SAR Equipment, and IAMSAR Volume III - Mobile Facilities). Where such a standard does not exist, the criteria have been established by SAR experts and will be validated on an ongoing basis.

The combination of resource, equipment and crew capabilities are assessed to arrive at a SAR capability rating. The capability rating is not a pass or fail, and there is a subjective component to the rating. Its objective is to lay out in a common format the factors considered when assessing SAR coverage or the design of a vessel for SAR operations.

The following twelve SAR capabilities and their associated rating criteria are to be used as a reference:

- A. Speed
- B. Endurance / Range
- C. Sea keeping
- D. Search
- E. Survivor Recovery/Care/Transportation
- F. First Aid / Medical
- G. On Scene Coordination
- H. Towing
- I. Fire Protective Equipment
- J. Dewatering
- K. Redundancy
- L. Survival Support

A-K are marine SAR Capabilities

A,B,D, E, F, G, L are Air SAR Capabilities

The following SAR Rating tables include references to standards (where they exist) as well as a brief explanation for each rating criteria. .

C.6 NATIONAL AIR AND MARINE SAR CAPABILITY MATRICES

As many regions and areas use similar resources, National Air and Marine SAR Capability Matrices are used to rate all types of SAR resources (various CCG, CAF and CCGA vessels; local resources; vessels of opportunity; aircraft; etc.). This extensive listing will be subject to validation from SAR program specialists, CCG Operations staff, SAR partners, operational personnel, and stakeholders.

The National Air and Marine SAR Capability Matrices help to ensure consistency of ratings between regions and areas, and makes for easier determination of SAR capabilities by the Analysis Team.

Note, air resources must be considered when designing marine SAR coverage, and rating the capability of these resources will ensure that no undue reliance is placed on less capable resources.

*C.7 NATIONAL MARINE SAR CAPABILITY – RATING CRITERIA***Table 13 – SAR Capability A – Speed (Sp)**

Rating	Criteria
7	Vessel able to make 40 knots or greater.
6	Vessel able to make 35 knots or greater.
5	Vessel able to make 30 knots or greater.
4	Vessel able to make 25 knots in fair conditions, or major vessel able to launch independent Fast Rescue Craft (FRC) that can make 25 knots.
3	Vessel able to make 20 knots.
2	Vessel able to make 15 knots.
1	Vessel able to make 10 knots or less.
Standards / application of criteria	There is no defined speed requirement standard, but speed is rated as it affects time to reach an incident and how quickly a resource can be dispatched to return the SAR unit for readiness posture.

Table 14 – SAR Capability B – Endurance / Range (End)

Rating	Criteria
7	Vessel range of at least 800 NM and greater than 40 hours of continuous operation.
6	Vessel range of at least 600 NM and 30 hours of continuous operation.
5	Vessel range of at least 400 NM and 20 hours of continuous operation.
4	Vessel range of at least 200 NM and 10 hours of continuous operation.
3	Vessel range of less than 200 NM and 10 hours of continuous operation.
2	Vessel range of less than 100 NM and 5 hours of continuous operation.
1	Vessel range of less than 50 NM and 3 hours of continuous operation.
Standards / application of criteria	Although these criteria are more useful for offshore areas and extended incidents, all assets will be rated.

Table 15 – SAR Capability C – Sea keeping (SK)

Rating	Criteria
7	Vessel able to operate effectively in storm conditions (winds of 50-55 knots) and sea state 10 (9-12.5 metres in open sea).
6	Vessel able to operate effectively in a strong gale (winds of 45 knots) and sea state 9 (7-10 metres in open sea).
5	Vessel able to operate effectively in a gale (winds of 35-40 knots) and sea state 8 (5.5-7.5 metres in open sea)
4	Vessel able to operate effectively in a near gale (winds of 30 knots) and sea state 7 (4-5.5 metres in open sea).
3	Vessel able to operate effectively in a strong breeze (winds of 25 knots) and sea state 6 (3-4 metres in open sea).
2	Vessel able to operate effectively in a fresh breeze (winds of 20 knots) and sea state 5 (2-2.5 metres in open sea).
1	Vessel able to operate effectively in a moderate breeze (winds of 15 knots) and sea state 4 (1-1.5 metres in open sea).
Standards / application of criteria	Existing requirement to operate in the prevailing environmental conditions: Beaufort Scale (http://www.tc.gc.ca/eng/marinesafety/tp-tp10038-80-wi-beaufort-scale-324.htm).

Table 16 – SAR Capability D – Search (S)

Rating	Criteria
7	Vessel has all equipment noted below; at least 20 feet height of eye; and sufficient crew to conduct visual and electronic searches simultaneously.
6	Vessel has all equipment noted below and Forward Looking Infrared (FLIR).
5	Vessel has baseline equipment plus Self Locating DMB (SLDMB).
4	Vessel has the following equipment and attributes: <ul style="list-style-type: none"> • electronic navigation equipment sufficient to conduct extended search in restricted visibility; • enclosed bridge with at least 8 feet height of eye; • Data Marker Buoy (DMB); • Direction Finder (DF); • binoculars; • search light with minimum candle power; and • night vision equipment.
3	Vessel has electronic navigation equipment, but does not carry one of the following: <ul style="list-style-type: none"> • enclosed bridge with at least 8 feet height of eye; • DMB; • DF; • binoculars; • search light with minimum candle power; or • night vision equipment.
2	Vessel has electronic navigation equipment, but does not carry two of the following: <ul style="list-style-type: none"> • enclosed bridge with at least 8 feet height of eye; • DMB; • DF; • binoculars; • search light with minimum candle power; or • night vision equipment.
1	Vessel does not have electronic navigation equipment or does not carry: <ul style="list-style-type: none"> • enclosed bridge with at least 8 feet height of eye; • DMB; • DF; • binoculars; • search light with minimum candle power; nor • night vision equipment.
Standards / application of criteria	SAR

Table 17 - SAR Capability E - Survivor Recovery, Care and Transportation (Rec)

Rating	Criteria
7	Vessel can carry more than 50 survivors in a sheltered location.
6	Vessel can carry more than 25 survivors in a sheltered location.
5	Vessel can carry more than 12 survivors in a sheltered location.
4	Vessel can carry less than 12 survivors in a sheltered location.
3	Vessel can carry less than 12 survivors in an exposed location.
2	Vessel can carry less than five survivors in a sheltered location.
1	Vessel can carry less than five survivors in exposed location.
Standards / application of criteria	Safety of Life at Sea SAR Convention - retrieve persons in distress, provide for their medical or other needs and deliver them to a place of safety.

Table 18 – SAR Capability F - First Aid / Medical Training, Space and Equipment (FA)

Rating	Criteria
7	Doctor of Emergency Medicine or equivalent.
6	Advanced Care Paramedic (ACP) or equivalent (e.g. Physician's Assistant).
5	Primary Care Paramedic (PCP) or equivalent (e.g. CAF SAR Technician).
4	CCG Rescue Specialist or equivalent (e.g. Emergency Medical Responder [3-week training course]) with SAR first aid equipment as per CGFO 207 or equivalent, and sheltered space for at least one stretcher patient.
3	Advanced first aid training (e.g. Marine Advanced First Aid, Medical First Responder, Advanced Wilderness First Aid, OFA 3 [1- or 2-week course]) or no shelter for at least one stretcher patient.
2	Standard first aid training (e.g. Marine Basic First Aid, Standard First Aid [2-day course]).
1	No first aid training (vessel may have First Aid trained person on board, but there is no requirement that this be carried).
Standards / application of criteria	CCG's SAR Levels of Service / Service Standards require that "all SAR units carry a trained Rescue Specialist capable of providing pre-hospital medical care".

Table 19 - SAR Capability G - On-Scene Coordination (OSC)

Rating	Criteria
7	Vessel has capability to co-ordinate air search in addition to the following attributes: <ul style="list-style-type: none"> • sufficient communications equipment (minimum 2 VHF - FM radio sets); • an enclosed bridge with space sufficient to lay out marine chart; and • personnel trained as On-Scene Coordinator.
6	In addition to the attributes below Vessel has sufficient crew to conduct simultaneous visual and electronic searches in addition to the following attributes: <ul style="list-style-type: none"> • sufficient communications equipment (minimum 2 VHF - FM radio sets); • an enclosed bridge with space sufficient to lay out marine chart; and • personnel trained as On-Scene Coordinator.
5	Vessel has sufficient crew to have a full navigational watch and an On-Scene Coordinator in addition to the following attributes: <ul style="list-style-type: none"> • sufficient communications equipment (minimum 2 VHF - FM radio sets); • an enclosed bridge with space sufficient to lay out marine chart; and • personnel trained as On-Scene Coordinator.
4	Vessel has the following attributes: <ul style="list-style-type: none"> • sufficient communications equipment (minimum 2 VHF - FM radio sets); • an enclosed bridge with space sufficient to lay out marine chart; and • personnel trained as On-Scene Coordinator.
3	Vessel is missing one of the attributes from rating level 4 criteria
2	Vessel is missing two of the attributes: from rating level 4 criteria
1	Vessel is missing three of the attributes: from rating level 4 criteria
Standards / application of criteria	For longer and more complex cases, the On-Scene Coordination attribute is a fundamental resource provided by CCG.

Table 20 - SAR Capability H - Towing (Tow.)

Rating	Criteria
7	Vessel is fitted for towing large displacement hull vessels and has a bollard pull of greater than 50 tonnes
6	Vessel is fitted for towing large displacement hull vessels and has a bollard pull of 20 to 50 tonnes
5	Vessel is fitted for towing displacement hull vessels greater than 36 feet and has a bollard pull of less than 20 tonnes
4	Vessel is fitted for towing a displacement hull vessel of at least 36 feet in 30 knot winds
3	Vessel is fitted for towing a displacement hull vessel of at least 30 feet in 20 knot winds
2	Vessel is fitted for towing a planning hull vessel of at least 24 feet in 20 knot winds
1	Vessel is not fitted for towing (no tow post or tow line)
Standards / application of criteria	Although towing may be a service of last resort, it can be a useful and practical SAR response strategy.

Table 21 - SAR Capability I - Fire Protective Equipment (FPE)

Rating	Criteria
6	Vessel has: <ul style="list-style-type: none"> • capability to refill self-contained breathing apparatus (SCBA) bottles on board; • spare SCBAs and bottles that can be transferred to casualty; • external fire monitor(s) to provide protective spray to allow safe approach; • capacity to rig fire hoses to provide protective spray to allow safe approach; • additional extinguisher(s) that can be transferred to casualty
5	Vessel has: <ul style="list-style-type: none"> • spare SCBAs and bottles that can be transferred to casualty; • external fire monitor(s) to provide protective spray to allow safe approach; • capacity to rig fire hoses to provide protective spray to allow safe approach; • additional extinguisher(s) that can be transferred to casualty
4	Vessel has: <ul style="list-style-type: none"> • external fire monitor(s) to provide protective spray to allow safe approach; • capacity to rig fire hoses to provide protective spray to allow safe approach; • additional extinguisher(s) that can be transferred to casualty
3	Vessel has: <ul style="list-style-type: none"> • capacity to rig fire hoses to provide protective spray to allow safe approach; • additional extinguisher(s) that can be transferred to casualty
2	Vessel has additional extinguisher(s) that can be transferred to casualty
1	Vessel carries no additional fire protective equipment
Standards / application of criteria	In line with Fleet Safety Manual 7.D.1 Search and Rescue Operations.

Table 22 - SAR Capability J - Dewatering (DeW)

Rating	Criteria
4	Vessel has a high-capacity submersible pump that can be deployed to another vessel
3	Vessel has two dewatering pumps, including one that can be deployed to another vessel
2	Vessel has a dewatering pump (minimum 3.5 hp) that can be deployed to another vessel
1	Vessel has no portable dewatering capability
Standards / application	In line with CGFO 207 - SAR Equipment

of criteria	
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Table 23 - SAR Capability K - Redundancy/Robustness (R/R)

Rating	Criteria
7	Vessel: <ul style="list-style-type: none"> • Has double hull; • stability condition for deck icing; • has three independent means of position fixing; or two compasses or VHF DF; and • Is twin screw and has backup steering system
6	Vessel: <ul style="list-style-type: none"> • stability condition for deck icing; • has three independent means of position fixing; or two compasses; or VHF DF; and • is twin screw and has backup steering system.
5	Vessel: <ul style="list-style-type: none"> • has double hull; • has three independent means of position fixing; or two compasses; or VHF DF; and • is twin screw and has backup steering system.
4	Vessel: <ul style="list-style-type: none"> • has three independent means of position fixing; or two compasses; or VHF DF; and • is twin screw and has backup steering system.
3	Vessel is twin screw and has backup steering system.
2	Vessel is twin screw.
1	Vessel has no redundancy of systems.
Standards / application of criteria	Statement of Operational Requirements for Offshore SAR ships, Motor Lifeboats, and Inshore Rescue Boats.

Table 24 - Marine Resource Description

Resource	Marine Resource Description
CCG ZH 753 Fast Rescue Craft (includes Inshore Rescue Boat)	7.53 metre rigid hull inflatable, typical crew of 3, twin outboard engines or inboard diesel engine, high speed (40 knots+), electronic navigation suite, capsized reversal system, SAR equipped.
CCG 47' Motor Lifeboat	Crew of 4, self-righting, 25 knots.
CCG 52' Motor Lifeboat	Crew of 4, self-righting, 25 knots.
CCG / Air Cushion Vehicle Hovercraft	Crew of 4-8, capable of 50 knots+.
CCG Mid-shore Patrol	Crew of 6-16.
CCG Offshore Fishery Science	Crew of 19-29.
CCG Offshore Oceanographic	Crew of 20-37.
CCG Offshore Patrol	Crew of 17-20.
CCG Medium Endurance Multi-tasked	Crew of 22-24.
CCG Light, Medium or Heavy Ice-breaker	Crew of 24-46.
CCGA ZH 753 Fast Rescue Craft	7.53 metre rigid hull inflatable, typical crew of 3, twin outboard engines or inboard diesel engine, high speed (40 knots+), electronic navigation suite, capsized reversal system, equipment and training varies by region and unit.
CCGA Dedicated Response Vessel	Vessel capabilities, equipment and training varies by region and unit.
CCGA Owner Operator	Vessel capabilities, equipment and training varies by region and unit.
RCMP Patrol Catamaran	18-20 metre aluminum catamaran, high speed (25 knots+) patrol vessel, crew of 4.
RCMP or City Police - Rigid Hull Inflatable	Rigid hull inflatable of varying lengths, vessel capabilities, equipment and training varies by region and unit.
City Fire Boat	
CAF Maritime Coastal Defence Vessel (MCDV)	55 metre patrol vessel, normal crew complement 31 naval reserve, extremely manoeuvrable, 15 knots maximum continuous speed, 5000 NM range at 9 knots.
CAF Patrol Frigate	134 metre patrol vessel, normal crew complement 225, speed 30+ knots, may carry CH-124 Sea King Helicopter.

Resource	Marine Resource Description
VOO - Small Commercial Fishing Vessel	<p><i>Note: Despite the wide range of commercial and recreational vessels that comprise Vessels of Opportunity, they were broken down in the categories listed here only. This decision was made since the SAR system relies on vessels of opportunity because of their proximity as opposed to their SAR capabilities, which are mostly limited.</i></p>
VOO - Large Commercial Fishing Vessel	
VOO - Tug or Small Cargo Vessel	
VOO - Large Cargo Vessel	
VOO - Small Ferry	
VOO - Large Ferry	
VOO - Cruise Ship	
VOO - Passenger Tour Boat (e.g. whale watching)	

C.8 NATIONAL MARINE SAR CAPABILITY MATRIX - SAMPLE FOR ILLUSTRATIVE PURPOSES

Table 25 - Marine Resources SAR Capability Ratings*

Resource	Marine Resources SAR Capability Ratings*													Total Ratings*
	A Speed	B End	C SK	D S	E Rec	F FA	G OSC	H Tow	I FPE	J DeW	K R/R	L S/S		
CCG ZH 753 Fast Rescue Craft (includes Inshore Rescue Boat)	7	2	5	2	1	3	2	2	1	2	2		29	
CCG 47' Motor Lifeboat	4	4	5	4	4	4	4	4	4	2	4		43	
CCG Mid- shore Patrol	2	7	6	5	6	4	5	5	4	2	6		52	
CCGA Offshore Fishing Vessel	2	7	4	1	5	2	3	3	1	1	1		30	
CAF Maritime Coastal Defence Vessel	2	7	4	4	5	4	6	4	3	1	4		44	
<p><i>*Ratings are to be applied to each resource available in the area under review.</i></p> <p><i>** The rating number is only used for rough comparative purposes. The criteria themselves have not been prioritized against each other - they are all considered equally important.</i></p>														

C.9 NATIONAL AIR SAR CAPABILITY RATING CRITERIA**Table 26 - Air SAR Capability A - Speed (Sp)**

Rating	Criteria
6	Craft cruising speed 200-300 knots and capable of slowing if required for optimal searching
5	Craft cruising speed 200-300 knots
4	Craft cruising speed 150-200 knots
3	Craft cruising speed 100-150 knots
2	Craft cruising speed < 100 knots
1	Craft normal operating speeds exceed 300 knots
Standards / application of criteria	There is no defined speed requirement standard, but speed is rated as it affects time to reach an incident and how quickly a resource can be dispatched to return the SAR unit for readiness posture. For SAR using an aircraft, speed can become an issue, as searching at too much speed is not practical.

Table 27 Air SAR Capability B – Endurance / Range (End)

Rating	Criteria
7	Range of +700 NM
6	Range of 600- 700 NM
5	Range of 500- 600 NM
4	Range of 400-500 NM
3	Range of 300- 400 NM
2	Range of 200- 300 NM
1	Range of less than 200 NM
Standards / application of criteria	

Table 28 - Air SAR Capability D - Search (S)

Rating	Criteria
7	Craft: has enhanced electronic searching technologies and SLDMB is IFR, has air and marine radio frequencies and DF has dedicated observation locations for spotters
6	Craft: has enhanced electronic searching technologies and SLDMB is IFR, has air and marine radio frequencies and DF
5	Craft is IFR, has air and marine radio frequencies and DF

4	Craft is IFR and has air and marine radio frequencies
3	Craft is IFR
2	Craft is VFR with air and marine radio frequencies
1	Craft is VFR with no additional tools for searching
Standards / application of criteria	SAR

Table 29 - Air SAR Capability E - Survivor Recovery and Transportation (Rec)

Air SAR Capability E - Survivor Recovery and Transportation (Rec.)	
Rating	Criteria
6	Craft can winch up casualties and take more than 20 survivors
5	Craft can winch up casualties and take up to 20 survivors
4	Craft can winch up casualties and take up to 12 survivors
3	Craft can winch up casualties and take up to 5 survivors
2	Craft can land on incident site and take more than 5 survivors
1	Craft can land on incident site and take up to 5 survivors
Standards / application of criteria	SAR Convention - retrieve persons in distress, provide for their medical or other needs and deliver them to a place of safety

Table 30 – Air SAR Capability F - First Aid / Medical Training, Space and Equipment (FA)

Rating	Criteria
7	Doctor of Emergency Medicine or equivalent
6	Advanced Care Paramedic (ACP) or equivalent (e.g. Physician's Assistant)
5	Primary Care Paramedic (PCP) or equivalent (e.g. CAF SAR Technician)
4	CCG Rescue Specialist or equivalent (e.g. Emergency Medical Responder [3-week training course]) with SAR first aid equipment as per CGFO 207 or equivalent
3	Advanced first aid training (e.g. Marine Advanced First Aid, Medical First Responder, Advanced Wilderness First Aid, OFA 3 [1- or 2-week course]) or shelter for at least one stretcher patient
2	Standard first aid training (e.g. Marine Basic First Aid, Standard First Aid [2-day course])
1	No first aid training (vessel may have First Aid trained person on board, but there is no requirement that this be carried)
Standards / application	

of criteria	
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Table 31 - Air SAR Capability G - On Scene Coordination (OSC)

Air SAR Capability G - On Scene Coordination (OSC)	
Rating	Criteria
4	Craft has trained On-Scene Coordinator and sufficient crew to allow On-Scene Coordinator to focus on On-Scene Coordination role
3	Craft has trained On-Scene Coordinator
2	Craft has enhanced communications capabilities (air and marine) but no trained On-Scene Coordinator
1	Craft has no special On-Scene Co-ordination capabilities
Standards / application of criteria	

Table 32 - Air SAR Capability L - Survival Support (S/S)

Air SAR Capability L - Survival Support (S/S)	
Rating	Criteria
4	Craft can deploy life rafts
3	Craft can deploy water and rations
2	Craft can deploy dewatering pump
1	Craft has no survival support equipment
Standards / application of criteria	

Table 33 - National Air SAR Capability Matrix

Resource	Air SAR Capability Ratings*														Total Ratings*
	A Speed	B End	C SK	D S	E Rec	F FA	G OSC	H Tow	I FPE	J DeW	K R/R	L S/S			
Hercules															
Aurora															
Cormorant															
Griffon															
CCG MBB-105															
CCG - 212															
PAL XXX															
Cougar S-61															
<p>*Ratings are to be applied to each resource available in the area under review. ** The rating number is only used for rough comparative purposes. The criteria themselves have not been prioritized against each other - they are all considered equally important</p>															

C.10 AREA SAR CAPABILITY MATRIX

The Area SAR Capability Matrix is an overview of all marine and air SAR resources available in the area under review and is prepared based on the ratings identified in the National Air and Marine Capability Matrix.

The Analysis Team needs to gather information about and describe the resources prior to applying the rating criteria. Using the National Air and Marine SAR Capability Matrices, they are to prepare the following two tables:

- Table 32 is the Area SAR Resource Description, where the Analysis Team provides a description of the attributes of the vessel/aircraft, equipment and crew that are relevant to SAR capability. This description is based on facts and will form the basis of Table 2. This resource description table will primarily be used for informing stakeholders on the various potential responders.
- Table 33 is the Area SAR Capability Matrix, where the Analysis Team applies the rating criteria for the selected SAR capabilities to the air and marine resources available in the area under review.

Note: The information on air resources is relevant to the RAMSARD process for the following reasons:

- To inform stakeholders about the full breadth and scope of the potential response resources available in the area under review; and
- To inform stakeholders as to the necessary layers of a successful SAR system.

Example of Area SAR Capability Matrix

Table 34 - Area X SAR Resource Description (example; not real data)

Resources - Area X	Description
CCG ZH 753 Fast Rescue Craft (includes Inshore Rescue Boat)	7.53 metre rigid hull inflatable, typical crew of 3, twin outboard engines or inboard diesel engine, high speed (40 knots+), electronic navigation suite, capsize reversal system, SAR equipped
CCG 47' Motor Lifeboat (MLB)	Crew of 4, self-righting, 25 knots
CCGA Owner Operator	Vessel capabilities, equipment and training varies by region and unit
RCMP or City Police - Rigid Hull Inflatable	Rigid hull inflatable of varying lengths. Vessel capabilities, equipment and training varies by region and unit
VOO - Small Commercial Fishing	
VOO - Large Cargo	
VOO - Small Ferry	
VOO - Passenger Tour Boat (e.g. whale watching)	

Table 35 - Area X SAR Capability Matrix (example; not real data)

Resource	Area X SAR Capability Matrix												
	A - Speed	B - End	C - SK	D - S	E - Rec	F - FA	G - OSC	H - Tow	I - FPE	J - DeW	K - R/R	L - S/S	Total Ratings*
CCG ZH 753 Fast Rescue Craft (includes IRB)	7	2	5	2	1	3	2	2	1	2	2		29
CCG 47' Motor Lifeboat	4	4	5	4	4	4	4	4	4	2	4		43
CCG Mid-shore Patrol	2	7	6	5	6	4	5	5	4	2	6		52
CCGA Offshore Fishing Vessel	2	7	4	1	5	2	3	3	1	1	1		30
CAF Maritime Coastal Defence Vessel	2	7	4	4	5	4	6	4	3	1	4		44
AIR													
<p><i>*Ratings are to be applied to each resource available in the area under review.</i></p> <p><i>** The rating number is only used for rough comparative purposes. The criteria themselves have not been prioritized against each other - they are all considered equally important</i></p>													

C.11 SAR RESPONSE MODEL

The coverage model is based on search and rescue response.

When examining the response at the operational level, the policy underpinnings must be in place. The policy underpinnings are the role that CCG SAR Units have in the Canadian SAR system. Although many expect that the CCG is the first, mid-level and last resource for SAR incidents all at once, this is not the case. Over the past twenty years, the shift has been steadily further away from a CCG total response model.

The move to station-based lifeboats began in the 1990s as the large ship fleet was rationalized. This saw the last of the offshore SAR ships retired and replaced by an increased and renewed lifeboat fleet and maintenance of offshore SAR zone coverage where required by multi-tasked vessels.

Now, in Canada, SAR services are provided by the following four categories of resources:

- Category 1 - Primary SAR resources (lifeboats, inshore rescue boats, CCG ships assigned to SAR coverage)
- Category 2 - Secondary federal government resources (CCG vessels not assigned to SAR duties, CAF vessels, RCMP, Parks Canada)
- Category 3 - Other responders (non-federal government, CCGA, civilian agencies)
- Category 4 - Civilian responders (commercial or recreational vessels of opportunity)

C.12 RESPONSE TO M1 INCIDENTS- DISTRESS

In the case of M1 incidents, which are actual distress incidents, the role of the CCG SAR Units may not be that of first responder on scene. When a distress is declared, proximity and speed of resources are more important than the total capability they provide. In these cases, CCG resources can fulfill a number of roles, including primary responder, on-scene coordinator and rescue platform.

For this type of incident, it will be helpful to look at a risk scenario. A good example of risk scenario in this case is a large ferry on fire or sinking. Given the large numbers, geographical distribution and the low incident rate, it would not be appropriate to have a fully capable resource within the vicinity of every ferry in Canada. Rather, this risk may be covered as follows:

- A CCG lifeboat can provide on-scene communications and coordination for the first 12 to 36 hours, until it can hand off this responsibility to a more capable resource if the distress phase is not resolved before more capable government resources arrive;
- This approach allows for others, such as vessels of opportunity, to respond while the on-scene coordination and communications are being professionally managed by the CCG lifeboat;
- If a more capable government resource is available, the lifeboat becomes a responder of special capability that can be utilized by the on-scene co-ordinator as needed; and
- CAF air resources are available to assist with on-scene communications and coordination in cases where the workload needs to be shared due to volume or where the CCG resource is unable to respond.

Coverage for more frequent M1 events, particularly those involving pleasure craft or fishing vessels, may be provided solely by CCG SAR Units. In areas where the risk profile indicates a need for SAR coverage, it is beneficial to have a resource positioned that enables a primary response. This resource may be a lifeboat station or an inshore rescue boat station, depending on the level and timing of the risks. The majority of the work for SAR vessels involves M3 incidents; however, SAR vessels are considered primary responders within their area of operation for all categories of incidents.

C.13 RESPONSE TO M2 INCIDENTS – POTENTIAL DISTRESS

M2 incidents are potential distress incidents. Typically, when coverage is assessed and in place for both the M3 and M1 categories, there is no need for supplementary coverage for M2 incidents. If the risk profile indicates a high rate of M2 incidents with unacceptable outcomes, this assumption may be revisited.

As a result of both the capability and location of CCG SAR Units, they are often able to intervene at the M2 level. At the M2 level, they may request commercial ships to respond, but may not compel them to do so. The M2 incidents are more likely to have major government vessels diverted from other tasks and support from CCGA to augment the CCG response. The nature of the incident will determine the magnitude of the response. At the M2 level, the SAR Mission Coordinator may use their discretion to elevate the case to an M1.

C.14 RESPONSE TO M3 INCIDENTS – UNCERTAINTY PHASE (NON-DISTRESS)

The preceding description of where the CCG SAR Units are as assets is an important precursor to understanding the professional, scalable response that is available for SAR incidents in all categories.

Risks associated with M3 incidents are well understood, and the RAMSARD methodology uses historic incident data as approximations for risk scenarios. In these scenarios, there are a range of acceptable SAR Units that can safely provide a response depending on the circumstances, including the area of operation, the type and size of vessel requiring assistance, and the nature of difficulty. The range of potentially suitable responders includes recreational craft, fishing vessels, fast rescue craft, lifeboats, patrol craft, and major government vessels.

CCG provides the majority of the response to M3 incidents in areas of high traffic volume. M3 incidents are those that are resolved in the uncertainty phase. Typical incidents in this category are a disabled vessel that need a tow, fuel or mechanical assistance; loss of situational awareness requiring locating and redirecting; a vessel aground with no danger to crew that must wait for high tide or commercial towing assistance. When no commercial assistance alternative is available, these calls fall to the CCG for response, as there are no legal grounds or desire to divert commercial ships for non-distress incidents.

Even with CCG providing SAR Units to resolve M3 incidents, there are many cases where another resource is on scene and provides the service first. Such instances can often be handled either by CCGA or other government resources who suffer little or no imposition by responding to such events. In some cases, private vessels in the area assist vessels requiring support without being compelled to do so.

Most of the M3 incidents happen near shore, and the associated risk should be covered adequately by relatively small vessels. There are exceptions related primarily to disabled vessels in offshore areas.

C.15 RESPONSE TO M4 INCIDENTS – FALSE ALARMS OR HOAXES

M4 incidents are classified as false alarms or hoaxes after the closure of the incident. However, until it is determined that they are a false alarm, they are usually treated as M1 and M2 incidents, with a corresponding level of response.

C.16 SAR COVERAGE DETERMINATION

The following three definitions are used in the *2007 SAR Needs Analysis*:

- **SAR system coverage capability:** the ability of vessels/crews to provide response to SAR cases, as evaluated by vessel features such as size, speed, manoeuvrability, power, equipment on board, etc.;
- **SAR system coverage capacity:** the number of vessels in an area capable of providing SAR response.

Both of these definitions only speak to the number of vessels capable of responding and the ability to respond based on the characteristics of the vessels. The RAMSARD process looks at capability and capacity but also looks more broadly at SAR coverage. In this instance, the definition will be: SAR coverage: the people, equipment (including aircraft) and resources considered available for a response to a search and rescue event.

- SAR **coverage** can be subdivided into two categories, planned and opportunity coverage:
 - Planned coverage includes: CCG lifeboats, CCG inshore rescue, multi-tasked CCG ships assigned to offshore zones, RCAF fixed and rotary wing primary SAR aircraft, and oil rig standby vessels (TP7920 Standards Respecting Standby Vessels).
 - Opportunity coverage includes but is not limited to: other CCG vessels not on SAR standby, CCG Auxiliary vessels, Royal Canadian Navy vessels, other government vessels and aircraft, as well as all commercial and recreational vessels.

In waters of Canadian interest, the communications and co-ordination of SAR at the system level are all planned coverage. In some M1 cases, there is a need for on-scene co-ordination and communication which is normally planned to be provided by a government vessel or aircraft. Given the remoteness of some locations, it may be necessary for non-government resources to provide this service.

The process for assessing SAR response coverage includes looking at the locations where the risks take place, followed by the severity of the incidents that take place and then followed by the types of incidents that take place.

Table 36 – Area SAR Risk Estimation Matrix (example; not real data)

Impact	Extreme	13, 14, 21				
	High		15, 22			
	Moderate		9	10	5	
	Low	23		18,	6, 16, 19, 20,	1, 2
	Negligible	24			7, 8, 11, 12	3, 4
		Rare	Unlikely	Moderate	Likely	Almost Certain
		Likelihood				

Based on the information collected in the preliminary analysis as well as data provided through systems such as SISAR, the reviewer is to fill out the table below to give an overview of the incidents happening in the area as well as the locations where they happen within a specified time frame.

Table 37 - Breakdown of Incidents by Category, Type and Location: Area X

Category	Incident Type	Remote	Offshore	Near Shore	Total
M1	Fire / explosion				
	Taking on water				
	Striking / collision				
	Grounding				
	Capsize				
	Other				
	Total (M1)				
M2	Fire				
	Taking on water				
	Striking / collision				
	Disabled				
	Grounding				
	Other				
	Total (M2)				
M3	Overdue				
	Disoriented				
	Disabled				
	Grounding				
	Other				
	Total (M3)				
M4	Hoax				
	Unknown				
	Total (M4)				
All	Total (all cat.)				

C.17 CAPABILITY RELEVANCE

The relevance rating is based on a scale from one to five, with one being not very relevant, and five being extremely relevant. To fill out the Relevance Rating Table for incidents, the reviewer must assess the significance (or relevance) of each air and marine resource capability rating against the SAR response that must be provided to the incidents identified in the Breakdown of Area Incidents by Category, Type and Location table (above). Relevance ratings are attributed through 4 different tables:

- M1/M2 incidents happening near shore;
- M1/M2 incidents happening offshore;
- M3 incidents happening near shore; and
- M3 incidents happening offshore

The comments column provides an opportunity to expand on the relevance or nuances associated with the capability. For example: The searching may be rated as highly relevant (5) and the comments may indicate: the area has many islands and normal operations require high speed searches amongst islands and shorelines. This comment should be reflected in the preferred SAR units for the task.

The relevance rating is never to be used as a tool for deleting or reducing a capability. Capability may be necessary to safeguard the crew or for assuring preparedness

Once the relevance ratings are attributed to each capability criteria, the SAR units identified in the Area X SAR Capability Matrix will be assessed against these ratings. This approach will allow the reviewer to match preferred responders or SAR units to the risks indicated in the risk profile.

Note: Given the overriding role of vessels of opportunity and the role that proximity plays in M1 incidents, the capability relevance should look primarily at providing on-scene coordination and communications. **To ensure a consistent approach to this nationally, the relevance of OSC and Redundancy/Robustness will be rated at 5 and no other capability may be rated at 5.**

Table 38 - Relevance Ratings for M1/M2 Incidents Happening Near Shore in Area X

Capability	Relevance	Comments	Preferred SAR Units
Speed			
Endurance			
Sea keeping			
Searching			
Rescue/Transport			
First Aid			
On-Scene Command			
Towing			
Fire Protection			
Dewatering			
Redundancy/Robustness			

Capability	Relevance	Comments	Preferred SAR Units
Survival/Support			

Table 39 - Relevance Ratings for M1/M2 Incidents Happening Offshore in Area X

Capability	Relevance	Comments	Preferred SAR Units
Speed			
Endurance			
Sea-keeping			
Searching			
Rescue/Transport			
First Aid			
On Scene Command			
Towing			
Fire Protection			
Dewatering			
Redundancy/Robustness			
Survival/Support			

C.18 SAR CAPACITY REQUIRED FOR M3 INCIDENTS

The SAR Capacity requirements will be in a narrative format and include:

- A brief area description
- A recap of the seasonal divisions and rational (if applicable)
- Planned primary coverage
- Reliance on secondary, other and civilian coverage.
- The role that both air and marine assets (primary, secondary, other and civilian) fill in covering the risks in conjunction with each other.
- Assessment as to whether the mix of planned and opportunity coverage is adequate given the risk profile for M3 incidents in the area.

Table 40 - Relevance Ratings for M3 Incidents Happening Near Shore in Area X

Capability	Relevance	Comments	Preferred SAR Units
Speed			
Endurance			
Sea keeping			
Searching			
Rescue/Transport			
First Aid			
On Scene Command			
Towing			
Fire Protection			
Dewatering			
Redundancy/Robustness			
Survival/Support			

Table 41 - Relevance Ratings for M3 Incidents Happening Offshore in Area X

Capability	Relevance	Comments	Preferred SAR Units
Speed			
Endurance			
Sea-keeping			
Searching			
Rescue/Transport			
First Aid			
On Scene Command			
Towing			
Fire Protection			
Dewatering			
Redundancy/Robustness			
Survival/Support			

C.19 SAR CAPACITY REQUIRED FOR M1/M2 INCIDENTS

The SAR Capacity requirements will be in a narrative format and include:

- A brief area description
- A recap of the seasonal divisions and rational (if applicable)

- Planned primary coverage
- Reliance on secondary, other and civilian coverage.
- The role that air assets Primary, secondary, other and civilian fill in covering the risks in conjunction with marine assets.
- Assessment as to whether the mix of planned and opportunity coverage is adequate given the risk profile for M1 and M2 incidents in the area paying particular regard to the capability and capacity in place for the M3 incidents.

C.20 SAR COVERAGE CHARTS

For each area assessed, the Analysis Team or reviewer will develop the following charts:

- A Primary Coverage Chart will be developed for the area that indicates the coverage by Category 1 - Primary SAR resources. The chart will show radius of operation of each of the assets except the offshore patrol vessel which will show an area of operation. If the area has been assigned seasons, a chart will be developed for each season.
- The Secondary Coverage Chart will show an indication of the capacity and capability provided by Category 2 - Secondary federal government resources. This will be done for each season.
- The Tertiary Coverage Chart will show an indication of the capacity and capability provided by Category 3 - Other responders.
- The Civilian Coverage Chart will show the capacity and capability provided by Category 4 - Civilian responders.
- The Total SAR Coverage Chart will blend all of the above information on the chart. This chart, although complex, is a representation of what needs to be analyzed when assessing coverage and the implications of lapses or changes to planned SAR coverage. The information is not linear, but multi-faceted; it is managed by a wide range of organizations, but provides the complete picture of what must be assessed.

When displaying the information layers, the capability aspect of each layer must be clear. Although large volumes of civilian traffic will show as a large group of potential responders, they are largely the SAR systems clients and they typically bring a low level of capability. When the Total SAR Coverage Chart is first viewed, it will always look like there is an excess of potential responders.

C.21 OBSERVATIONS

The reviewer will make any relevant observations about the coverage, capacity or capability and put them forward as discussion items during consultations. Once the information will be consulted upon, the reviewer will inventory and make note of the observations and comments received, and formulate recommendations to the review committee for consideration where deemed appropriate.

Annex D Products Checklist

(To Be Promulgated)

Annex E Maritime Service Risk Assessment Scales

(To Be Promulgated)

Annex F Glossary of Terms

English	French	Definition
Aeronautical incident	Incident aéronautique	A search and rescue incident involving an aircraft
Benchmark	Point de référence	A measurable guideline of what can be expected (e.g. timeliness, accuracy, access).
Capacity	Capacité	The availability and response time of vessels in an area capable of providing search and rescue response.
Capability	Aptitude	The ability of vessels, aircraft and crews to provide response to search and rescue cases, as evaluated by aircraft/vessel characteristics (size, speed, sea keeping, etc.), equipment carried, and crew training and qualifications.
Civil Air Search and Rescue Association (CASARA)	Association civile de recherche et sauvetage aériens (ACRSA)	A volunteer organization which provides aeronautical search and rescue support.
Canadian Coast Guard Auxiliary (CCGA)	Garde côtière auxiliaire canadienne (GCAC)	A volunteer organization which assists the Canadian Coast Guard in search and rescue response and prevention activities.
Consultation	Consultation	The seeking and giving of advice, information, and/or opinion, usually involving a consideration.
CSA Q850	Norme CSA Q850	Risk Management: Guideline for Decision-Makers. The Canadian Standard Association's risk management standard. This national standard of Canada provides an effective, credible, and internationally recognized framework for decision-making about the broadest range of risk decisions.
Decision-Maker	Décideur	A person or group with the power or authority to make decisions.
Dialogue	Dialogue	A process for two-way communication that fosters understanding. It is supported by exchange of information.
Distress	Détresse	A search and rescue incident where there is a reasonable certainty that one or more individuals are threatened by grave and imminent danger and require immediate assistance.
Fast Rescue Craft (FRC)	Embarcation rapide de sauvetage (ERS)	A rigid-hull inflatable with a V-shaped, fiberglass hull and inflatable sponson around the perimeter.

English	French	Definition
Hazard	Danger	A source of potential harm, or a situation with a potential for causing harm, in terms of human injury, damage to health, property, the environment, and other things of value, or some combination of these.
Humanitarian Incident	Incidents d'ordre humanitaire	A search and rescue incident (not aeronautical or maritime) which requires a response by the search and rescue system to preserve human life or relieve suffering.
Inter-departmental Committee on Search and Rescue (ICSAR)	Comité interministériel de recherche et sauvetage (CIRS)	Consists of senior officials representing federal departments and agencies involved in the National Search and Rescue program. The committee is responsible for advising the Lead Minister of Search and Rescue and the government on issues related to search and rescue in Canada. ICSAR exists to provide interdepartmental co-ordination and advice to the Ministers in the Areas of search and rescue policy, planning, resources, and effectiveness.
Incident rate	Taux d'incidents	The number of incidents relative to the amount of traffic.
Initiation	Lancement	Consists of defining and structuring the organization's objectives; defining the opportunity or problem triggering the need for risk management decisions; identifying associated risk issues; setting up the risk management team; and beginning the identification of affected stakeholders.
International Maritime Organization (IMO)	Organisation maritime internationale (IMO)	The United Nations' specialized agency responsible for safety and security of shipping and for the prevention of marine pollution by ships.
Inshore Rescue Boat (IRB)	Embarcation de sauvetage côtier (ESC)	A seasonal Canadian Coast Guard program in which university students (in some regions with Canadian Coast Guard coxswains) operate a fast rescue craft and provide response to search and rescue incidents during the high season.
Joint Rescue Coordination Centre (JRCC)	Centre conjoint de coordination des opérations de sauvetage (JRCC)	One of three centres in Canada (in Halifax, Trenton, and Victoria), jointly staffed by Canadian Forces and Canadian Coast Guard personnel responsible for planning, co-ordinating, controlling and conducting aeronautical and maritime search and rescue operations within their Search and Rescue Region.

English	French	Definition
Level of Service (LOS)	Niveau de service (NS)	Standards designed to provide Canadian Coast Guard clients with a clear understanding of the services to be expected.
Lives Lost	Vies perdues	Lives lost during a search and rescue incident (maritime, aeronautical or humanitarian).
Lives Saved	Vies sauvées	Persons whose lives were at risk during a search and rescue incident, but who survived.
Loss	Perte	An injury or damage to health, property, the environment, or something else of value.
Maritime Incident	Incident maritime	A search and rescue incident on the water involving a vessel or a person, including the medical evacuation of person(s) from a vessel.
Matrix	Matrice	A tool where options are evaluated against set criteria to aid in the decision-making process.
Medical Evacuation (Medevac) - critical	Évacuation médicale (Medevac) – critique	The critical evacuation of injured or stranded persons from isolated Areas or the recovery of sick or critically injured persons from vessels at sea.
Medical Evacuation (Medevac) - routine	Évacuation médicale (Medevac) – routine	The routine medical evacuation of patients or vital medical resources from one medical facility to another (aeronautical or maritime ambulance service).
Monitoring	Surveillance	As part of the risk management decision process, the undertaking of a conscientious review of an operating environment or system and of its associated decision processes. The monitoring program has four key purposes: to detect and adapt to changing circumstances; to ensure that the activities are achieving the results expected of them; to ensure proper implementation of communication, control and residual risk strategies; to verify correctness of assumptions.
National SAR Secretariat (NSS)	Secrétariat national de recherche et de sauvetage (SNRS)	An autonomous arm's length organization within the Department of National Defense, accountable to the Lead Minister for Search and Rescue (Minister of National Defense). Established in 1986, the NSS is responsible for the management and coordination of the National Search and Rescue Program.
On-Scene Coordinator	Coordonnateur sur les lieux	The commander of a search and rescue unit designated to co-ordinate search and rescue operations within a specified search area.

English	French	Definition
Primary SAR Resources	Ressources primaires de SAR	Federal search and rescue aircraft and vessels, including those multi-tasked to SAR, established and equipped specifically for search and rescue, with search and rescue trained crews aboard. Primary search and rescue resources are under the direct operational control of the Search and Rescue Region Commander for search and rescue tasking and maintain a maximum 30-minute state of readiness.
Problem	Problème	An undesirable event or situation that has occurred or will certainly occur in the future. A problem is something you must deal with now, whereas a risk is something you should plan for in the future.
Rescue Coordination	Coordination des opérations de sauvetage	The function of integrating the efforts of search and rescue facilities and resources to achieve concerted and harmonized resolution of search and rescue incidents in an effective and efficient manner.
Residual Risk	Risque résiduel	The risk remaining after risk control strategies have been applied.
Risk	Risques	An expression of exposure to loss. 1. The potential of injury or loss, as defined as a measure of the probability and severity of an adverse effect to health, property, the environment, or other things of value. 2. The uncertainty that surrounds future events and outcomes. It is the expression of the likelihood and impact of an event with the potential to influence the achievement of an organization's objectives.
Risk Analysis	Analyse des risques	The systematic use of information to identify hazards and estimate the chance for, and severity of, injury or loss to individuals or populations, property, the environment or other things of value.
Risk Assessment	Évaluation des risques	The overall process of Risk Analysis and Risk Evaluation. It involves identifying risks and assessing the effects of those risks on program delivery and program effectiveness.

English	French	Definition
Risk Communications	Communications des risques	A set of communication and consultation activities designed to support the decision process by providing information necessary for defining stakeholder issues and for understanding the trade-offs inherent in the decision situation. Any two-way communication between stakeholders about the existence, nature, form, severity or acceptability of risks.
Risk Control Option	Option de maîtrise des risques	An action intended to reduce the frequency and/or severity of injury or loss, including a decision not to pursue an activity. Risk control options should be evaluated in terms of their cost, their effectiveness in reducing losses and their impact on other stakeholder objectives.
Risk Control Strategy	Stratégie de maîtrise des risques	A program which may include the application of several risk control options.
Risk Estimation	Estimation des risques	The activity of estimating the likelihood of a risk scenario occurring and estimating the impact on defined objectives if it does occur. The activity of estimating the frequency or probability and consequence of risk scenarios, including a consideration of the uncertainty of the estimates.
Risk Evaluation	Évaluation des risques	The process by which risks are examined in terms of cost and benefits, and evaluated in terms of their acceptability, considering the needs, issues, and concerns of stakeholders.
Risk Identification	Détermination des risques	The identification of situations that can negatively impact the achievement of the organization's objectives, described as risk scenarios.
Risk Management	Gestion des risques	The systematic application of management policies, procedures and practices to the tasks of analyzing, evaluating, controlling, and communicating about risk issues.
Risk Perception	Perception des risques	The significance assigned to risks by stakeholders. This perception is derived from the stakeholders' expressed needs, issues, and concerns.
Risk Scenario	Scénario de risque	A defined sequence of events with an associated likelihood and range of impact.

English	French	Definition
Search and Rescue (SAR)	Recherche et sauvetage (SAR)	Search and rescue comprises the search for, and provision of aid to, persons, ships or other craft which are, or are feared to be, in distress or imminent danger.
Search and Rescue Area	Secteur de recherche et sauvetage	Sub-divisions of the three Search and Rescue Regions, search and rescue Areas are statistical Areas created by the Department of National Defence for data collection purposes.
Search and Rescue Incident (mission)	Incident de recherche et de sauvetage (mission)	A reported situation which requires a response from the search and rescue system. This response is coordinated by a Joint Rescue Co-ordination Centre.
Search and Rescue Mission Coordinator (SMC)	Coordonnateur de mission de recherche et sauvetage (CMRS)	The official temporarily assigned to co-ordinate response to an actual or apparent distress situation.
Search and Rescue Region (SRR)	Région de recherche et sauvetage (RRS)	An area of defined dimensions associated with a Joint Rescue Coordination Centre within which search and rescue services are provided.
Search and Rescue Region Commander	Commandant d'une région de recherche et sauvetage (CRRS)	The person designated by the Chief of Defence Staff and authorized by the Canada Shipping Act, 2001 as being responsible for search and rescue operations within a Search and Rescue Region.
Search and Rescue Resource	Ressource de recherche sauvetage	A resource capable of responding to a search and rescue incident.

Annex G Tables & Matrices

(To Be Promulgated)