





GSAR RESPONSE ASSESSMENT AND DECISION MAKING SUPPORT

Title of Project	Partner	Type of Project	Project Description	Project Length(years)	SAR NIF Funding	Contribution from Other Sources	Total
Ground Search and Rescue Response Assessment and Decision Making Support	British Columbia Search and Rescue Association	Response	Through the development, peer review and testing of a risk assessment matrix and a decision making guide, the project will help SAR volunteers in meeting the requirements for assessing overall risk in SAR response.	2	\$ 479,834.90	\$ 102,500.00	\$ 582,334.90



Government of Canada Gouvernement du Canada National Search Secrétariat natio

and Rescue Secretariat n Secrétariat national Recherche et sauvetage We would like to acknowledge the financial support of the Government of Canada for this project through the Search and Rescue New Initiatives Fund (SAR NIF).

CONTEXT

The British Columbia Emergency Response Management System (BCERMS), the Incident Command System (ICS) based structure under which all emergency response in the province operates, has the following objectives:

- provide for the safety and health of all responders,
- save lives,
- reduce suffering,
- protect public health,
- protect government infrastructure,
- protect property,
- protect the environment, and
- reduce economic and social losses.

To fulfill the number one objective of BCERMS Emergency Management British Columbia (EMBC) develops policies under which SAR Volunteers operate, including The **Public Safely Volunteer Lifeline Safety Policy. The Search and Rescue Safety Program Guide and Provincial Operating Guidelines** (initially published in 2009) provide additional direction and guidance specific to Search and Rescue related issues.

Project Development Process

- BCSARA application for SAR NIF funding
- Research SAR-related risk assessment materials
- September 2013 SME Steering Committee
- Model development
- December 2013-February 2014 SAR Group feedback sessions
- Model adjustment
- Material preparation
- RADeMS Conference

MATRIX DEVELOPMENT

- Initial work done by Ross Cloutier and Neil Brewer to research existing Risk Assessment Matrix (RAM) models.
- Materials presented to advisory group for discussion at September 2013 meeting in Kamloops.

Josh Anderson Chris Armstrong Aaron Beardmore Neil Brewer (Project Manager) Ross Cloutier (Risk Management Consultant) Pascal Haegeli Mike Hudson Karl Klassen Jim Lavalley Jim McAllister Gilles Valade Jeremy Vandekerkhove Kent Harrison SAR Rescue Canada Parks Canada Kent Harrison SAR Bhudak Consultants Avisualanche Consulting South Columbia SAR Canadian Avalanche Centre Rescue Canada Director-at-large, BCSARA Canadian Avalanche Centre Vernon SAR

ALTERNATIVE RISK ASSESSMENT TOOL FORMATS

HEAT MAPS/MATRICES

Impact	Risk Management Actions					
Significant	Considerable management required	Must manage and monitor risks	Extensive management essential			
Moderate	Risks may be worth accepting with monitoring	Management effort worthwhile	Management effort required			
Minor	Accept risks	Accept, but monitor risks	Manage and monitor risks			
-	Low	Medium	High			
		Likelihood				



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DYNAMIC TOOLS

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ALTERNATIVE RISK ASSESSMENT TOOL FORMATS

US Coast Guard GAR Model - Capt. Scott LaRochelle

- Another model used for SAR risk assessment is the GAR Model (Green, Amber, Red)
- Six elements:
 - Supervision 0-10
 - Planning 0-10
 - Crew selection 0-10
 - Crew fitness 0-10
 - Environment 0-10
 - Event complexity 0-10
- Assign a score 0-10 for each element





ALTERNATIVE RISK ASSESSMENT TOOL FORMATS

MILITARY EXAMPLE - COMBINATION HEAT MAP/FORM

TF Pegasu High-Risk	is Decis	sion M	atrix			
DTG: 231630ZOCT07	TF: TF Tal	on		CG GO CG	NO-GO	
MISSION: 3xUSMil, 2xUrg, 1xUrg-S 1xGSW-Arm, 2xGSW-Abd						
REMARKS:	REMARKS:					
A/C PACKAGE	_1 👗	1 _ T	·	1		
MSN NECESSITY		TROOPS IN DNGR	ENEMY TGT	NOT TIME SENSITIVE		
MEDICAL NECESSITY		URGENT	PRIORITY	ROUTINE		
WX (D) CEILING & VIS		>700/2	>500/1	<500/1		
WX (N) CEILING & VIS	X	>1,000/3	>700/2	<700/2	PRED: 2,000-3 WORST: 1,000-2	
ILLUM & ANGLE	X	>79%, >30 40-	78%, <30 39-25%, >1	Hor <25%, Below Hor	ILLUM: 18% MOON ANGLE: 10%	
ENEMY THREAT	X	LOW	MODERATE	HIGH		
CREW RISK VALUE		LOW MO	DERATE HIGH	EXTRA HIGH		
MSN PLANNING TIME	< l	OPTIMUM = >6 Hrs.	ADEQUATE = 3-6 Hrs.	MINUMUM < 3 Hrs.	JAF-BLE-ABAD-JAF	
FLIGHT ROUTE		GOOD	MARGINAL	DIFFICULT		
EOF (AH, HH)		GOOD	MARGINAL	POOR		
OTHER CONSIDERATIONS	Crews >100 hrs (e.g., Single-ship Opn	5. in area s, No AH escort, UH >8,5	00 feet, CH>10,000 feet,	etc.)		
BN CDR	×	Recommend App	roval	A Second March		
P6 RECOMMENDATION:	× _	Recommend App	roval, WX no less	s than 1 statute m	ile	

MATRIX DEVELOPMENT

GENERIC 'IMPACT VS LIKELIHOOD' MATRIX (HEAT MAP)

EXAMPLE FROM MISSION SAR



	PROBABILITY OF OCCURRENCE					
CONSEQUENCES	VERY	UNLIKELY	LIKELY	VERY		
	UNLIKELY			LIKELY		
EATAL	HIGH RISK	VERY	VERY	VERY		
FATAL		HIGH RISK	HIGH RISK			
CEDIOUC	MEDIUM	HIGH RISK	VERY			
SERIOUS	RISK		HIGH RISK	HIGH RISK		
	LOW RISK	MEDIUM	HIGH RISK	VERY		
WIODERATE		RISK		HIGH RISK		
MINOR	VERY LOW	LOW RISK	MEDIUM	HIGH RISK		
	RISK		RISK			

ASSESSING SAR OPERATIONAL RISK

(from Colorado Mountain Rescue)

- Activity: (defined by catastrophic potential as some activities are more dangerous than others) helicopter long-line, swiftwater, rope rescue, mountain rescue, avalanche rescue or a search
- Personnel physical elements (skills, knowledge & experience): physical conditioning, physical skills, rescue techniques, emergency medical providers, experience in the environment, food & water, sleep
- Personnel mental elements: hazard recognition, situational awareness, adaptability and flexibility, deviations from established plans, judgment and leadership, teamwork, knowledge of resources available
- Personnel emotional elements: ego, who comes first, "Go fever," subjects emotional and psychological state, inter-team dynamics, leader control and authority
- External influences: public and official pressure, subject friends and family, media, other outside influences
- Survivability: who it is that is being rescued, what the medical necessity is
- Equipment: its appropriateness, its quality/quantity, maintenance, knowledge of how to use it
- Planning: time available, completeness, quality of information available, unknowns

MATRIX DEVELOPMENT

TRANSITION TO SPECIFIC ELEMENTS OF A SAR RESPONSE

	GO	MUST MANAGE TO GO	NO GO UNTIL MANAGED TO GO	NO GO
Activity	No Risk	Low risk	Moderate risk	High risk
Natural Hazards	No danger to personnel	Some danger to personnel	Danger to personnel	Significant danger to personnel
Personnel Skills & Experience	No danger to personnel	Some danger to personnel	Danger to personnel	Significant danger to personnel
Personnel Mental	Strong Team	Issues to address	Significant Concerns	Dysfunctional Team
Personnel Emotional	Strong Team	Issues to address	Significant Concerns	Dysfunctional Team
External Influences	Insignificant external pressures on decision making	Noticeable external pressures on decision making	Significant external influences on decision making	Loss of control of some decision making
Urgency	Very urgent response required	Urgent response required	Some urgency required in response	No urgent response required
Equipment	Excellent equipment and use knowledge	Good equipment and good use knowledge	Fair equipment or fair use knowledge	Poor equipment or poor use knowledge
Planning	Extensive time to plan	Adequate time to plan	Minimal time to plan	No time to plan

MATRIX DEVELOPMENT

SPECIFIC ACTIVITY DESCRIPTIONS ADDED

		MANAGE TO GO	NO GO UNTIL MANAGED TO GO	NO GO	Swiftwater Rescue activity-specific descriptors
Activity	No Risk	Low risk	Moderate risk	High risk	Elements: grade of river; load above river, on surface, surface & suspended, suspended & bottom, activities within standard practice
Natural Hazards	No danger to personnel	Some danger to personnel	Danger to personnel	Significant danger to personnel	Elements: grade of river, wave morphology, continuity of rapids, surface velocity, vertical drop, river bottom, % of surface flow downstream, temperature of water, clarity of water, hard hazards, wildlife, water toxicity, hydraulic hazard/consequence
Personnel Skills & Experience	No danger to personnel	Some danger to personnel	Danger to personnel	Significant danger to personnel	Elements: personnel appropriately trained, experience in the location, EMTs available, team rested & fed, skill margin
Personnel Mental	Strong Team	Issues to address	Concerns	Dysfunctional Team	Elements: team situation awareness, hazard analysis done, plan deviation, in or outside the team comfort zone, teamwork level, knowledge of other resources, leadership strength
Personnel Emotional	Strong Team	Issues to address	Concerns	Dysfunctional Team	Elements: humility level, calmness level, ego level, competitive level, who comes first, Go Fever level, subject state, inter-team dynamics, within the chain of command
External Influences	Insignificant external pressures on decision making	Noticeable external pressures on decision making	Significant external influences on decision making	Loss of control of some decision making	Elements: public, family, media, other agency, management
Urgency	Very urgent response required	Urgent response required	Some urgency required in response	No urgent response required	Elements: recovery; subject location, stability, fitness, thermal protection, hypothermia, panic level, age, medical issues
Equipment	Excellent equipment and use knowledge	Good equipment and good use knowledge	Fair equipment or fair use knowledge	Poor equipment or poor use knowledge	Elements: equipment appropriateness, complexity of the system, PFD quality, thermal protection, boat type, power options (paddle, oar, engine)
Planning	Extensive time to plan	Adequate time to plan	Minimal time to plan	No time to plan	Elements: information quality, pre-plan preparation, time to review operational plan, management team consensus

Assessing SAR Operational Risks

DEVELOPMENT OF 'X' AND 'Y' AXIS COMPONENTS (ELEMENTS)

1. <u>SAR Operation Risk</u> Risks associated with: Complexity Activity Hazards Environmental Conditions Vulnerability (team exposure) External Influences 2. <u>Team Capability</u> Risks associated with lack of: Personnel Training Personnel Experience Personnel Preparedness (mental and physical) Planning Resources

MATRIX DEVELOPMENT

SAR GROUP PRESENTATIONS (16)



Extreme caution, operational changes or additional resources are required. Risks are not acceptable as they are. Proceed with SAR Management tasks and limited response until controls or resources are in place to further reduce the risks.









Matrix Potential Scoring Systems

1, 2, 3, 4, 5

SAR Operation Risk Score

Team Capability Score

SAR Operational ComplexityHow complex & complicated is the task?Very LowLowModerateHighVery High12345	Personnel TrainingWhat level of training do personnel have?Very HighHighModerateLow12345
Activity HazardsHow much hazard is inherent in the activity?Very LowLowModerateHighVery High12345	Personnel ExperienceWhat level of experience do personnel have?Very HighHighModerateLowVery Low12345
Environmental ConditionsHow high are the environmental hazards?Very LowModerateHighVery High12345	Personnel Mental & Physical PreparednessHow mentally & physically prepared are personnel?Very HighHighModerateLowVery Low12345
VulnerabilityHow exposed and vulnerable are the team members?Very LowLowModerateHighVery High12345	PlanningHow much planning has there been?Very HighHighModerateLowVery Low12345
External InfluencesLevel of pressure due to survivability, media, family or other?Very LowLowModerateHighVery High12345	ResourcesWhat is the level of resources available?Very HighHighModerateLowVery Low12345
Total Score:	Total Score:

Matrix Potential Scoring Systems

-1, 0, +1

SAR Operation Risk Score

Team Capability Score

SAR Operational ComplexityHow complex & complicated is the task?LowModerate-10+1	Personnel TrainingWhat level of training do personnel have?High Moderate-10+1
Activity HazardsHow much hazard is inherent in the activity?LowModerate-10+1	Personnel ExperienceWhat level of experience do personnel have?High Moderate Low-10+1
Environmental HazardsHow high are the environmental hazards?LowModerateHigh-10+1	Personnel Mental & Physical PreparednessHow mentally & physically prepared are personnel?HighModerateLow-10+1
VulnerabilityHow exposed and vulnerable are the team members?LowModerate-10+1	Planning How much planning has there been? High Moderate Low -1 0 +1
External InfluencesLevel of pressure due to survivability, media, family or other?LowModerate-10+1	Resources What is the level of resources available? High Moderate Low -1 0 +1
Total Score:	Total Score:

MATRIX DEVELOPMENT

FINAL CARD FORMAT





SAR Operation Risk Score

Response Capability Score





RATING GUIDES

Accompanying information to help define the rating categories.

- 1. Ground Search
- 2. Rope Rescue
- 3. Mountain Rescue
- 4. Swiftwater Rescue

RATING GUIDES

OPERATION RISK SCORE – GROUND SEARCH

			1a SAR OPERATION RISK SCORE RATING GUIDE – GROUND SEARCH					
	0	LOW	Simple operation, requiring one or two single activities (e.g. Locate and escort to safety). 1-8 hour duration. Minor subject injuries.					
Operational Complexity	1	MODERATE	More complex operation, requiring multiple activities (e.g. Locate and evacuate using a litter) with some challenges both in access and egress. 8-24 hour duration. Significant non-life-threatening injuries					
	2	нібн	Very complex operation involving multiple teams. Convergent volunteers. Difficult access and egress. Helicopter transport. Multi-day or multi- organization response. Life-threatening injuries.					
	0	LOW	basic GSAR activities; orienteering, tracking and/or sweep searching. Simple terrain. Hazards are low probability and low severity.					
Activity Hazarda	1	MODERATE	al for several disciplines required to access and evacuate the subject. Challenging terrain. Hazard probability high but severity manageable.					
	2	нідн	se may require use of several technical disciplines; rope rescue, swiftwater and/or avalanche assessment. Difficult terrain. Hazards are high ility and high severity.					
	0	LOW Minimal hazards. Good weather, stable forecast, daylight, warm temperatures and/or good visibility. Low elevation.						
Environmental	ronmental 1 MODERATE Moderate hazards. Uncertain forecast, low light, freezing temperature, moderate precipitation and/or broken visibility							
Conditions	2	HIGH	Extreme hazards. Impending forecast, drastic weather system, darkness, cold temperatures, heavy precipitation, high wind and/or obscured visibility. High elevation.					
	0	LOW	Minimal exposure to personnel. Good searching terrain. <1 hour exposure. <3 searchers exposed. Full 2-way communications.					
Vulnerability	1	MODERATE	Moderate exposure to personnel due to activity/environmental hazards and/or weather. Moderate terrain hazards. 1-4 hours exposure. 3-12 searchers exposed. Intermittent communications and/or relay available if required.					
	2	HIGH	High exposure due to extreme activity/environmental hazards and/or weather. Broken terrain, talus slopes and/or cliff bands. >6 hours exposure. >12 searchers exposed. Poor or no communications with field personnel.					
	0	LOW	Little or no degree of urgency due to either confirmed survivability or confirmed deceased (recovery). Little or no pressure from family, media or agency.					
External	1	MODERATE	Some degree of urgency due to subject survivability factors. Local publicity. Family on scene. Agency and/or press asking questions.					
innuence	2	HIGH	High degree of urgency due to critical subject survivability factors. High profile subject. Family on scene. Agency, national media influence and/or political pressure to resolve.					

RATING GUIDES

RESPONSE CAPABILITY SCORE – GROUND SEARCH

			1b RESPONSE CAPABILITY SCORE RATING GUIDE – GROUND SEARCH
	0	HIGH	Documented training proficiency appropriate for the activities required. Routinely train on incident site/area. High level of training (SAR Managers, Team Leaders, GSAR).
Personnel Training	1	MODERATE	Some training proficiency related to the activities required. Some training on incident site/area. Basic SAR team member training with Team Leader supervision.
	2	LOW	Little training proficiency related to the activities required. No training on, or familiarity with the incident site/area. No training in the terrain features. Low search member certification. New search team. Convergent volunteers used.
_	0	HIGH	Extensive experience appropriate for the activities required. Routinely respond to incident site/area. >20 similar responses. Many years of recreational experience. Professional experience.
Personnel Experience	1	MODERATE	Some experience related to the activities required. Some previous responses to site/area. 5-20 similar responses. Significant recreational experience.
	2	LOW	Little or no experience related to the activities required. Completely unfamiliar with the location. <5 similar responses. Little or no recreational experience.
Personnel	0	HIGH	Personnel are in good spirits, well-rested and exhibit characteristics of a cohesive team.
Mental &	1	MODERATE	Personnel are generally positive although some are tiring. Adequate physical condition.
Physical Preparedness	2	LOW	Personnel are negative and question decisions (see note on page 13). Resources have been on task through several assignments and are showing signs of exhaustion. Searchers have been involved for multi-operational periods. Unfit/does not exercise on a regular basis.
	0	HIGH	Plans (and/or Pre-plans) are in place, including contingencies, all documented.
Planning	1	MODERATE	Overall plan is in place, with some consultation. Basic notes taken about the site.
	2	LOW	Basic discussions on overall strategies and tactics. Nothing in writing for this site.
	0	HIGH	Appropriate resources are in place to cover all anticipated eventualities, contingencies and multi-operational periods.
Resources	1	MODERATE	Basic resources are in place to cover response. Back-up is available, but not on site.
	2	LOW	Resources are barely adequate. No back-up or contingency available.

RISK ASSESSMENT CYCLE



RADeMS REFERENCE GUIDE

8 1/2" X 5 1/2" SPIRAL-BOUND BOOKLET (WITH 2 CARDS)



SMART PHONE APPS

Android and iOS – search 'BCSARA'

	© Ground search
RADeMS	
	© Instructions
	O MR operation risk score
Ground and Inland Water Search and Rescue Response Assessment and Decision Making Support	Response capability score
Version 1.0.1	Personal basing 0
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Results can be named, saved and e-mailed.



DOWNLOADABLE EXECUTABLE FILE

Visit BCSARA web site



Results can be named, saved and printed.



JIBC ON-LINE PRESENTATION



PROMOTIONAL MATERIALS

18" x 24" POSTERS









6" X 3 1/2" STICKERS





STAINLESS STEEL WIDE-MOUTH WATER BOTTLES

SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015



- Initial call at 1732hrs on Sept 5^{th.}
- Information was that 2 people were missing at Bear Creek Falls.
- CDFL (long-line) response initiated with Chilliwack Search and Rescue.
- On scene at *Rainbow Falls* at 1830hrs.
- Third subject is the only one who made it out of the falls.
- Voice contact with first subject uninjured but stuck on cliff near bridge.
- CDFL on scene at 1900hrs
- Second subject located (by helicopter) at 1920hrs.
- Subject declared deceased due to location (fall) and position in water.

SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015



SITUATION

- Subject is deceased.
- 1 hour of daylight left for aircraft to recover subject, then return to Hope via Chilliwack.
- Rescuer would have to remain attached to line.
- Retrieval would involve tying a rope around the subject's legs.
- Still need to rescue first subject, but can do that without helicopter.

SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015







SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015



DECISION

 Postpone body recovery until 0700hrs next morning.

SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015







SEARCH AND RECOVERY, RAINBOW FALLS, SEPTEMBER 2015



Rescue and Valley Helicopters for their assistance.

CONTACT INFO

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